PROVINCIAL MINISTERS OF MINES

Twentieth Annual Conference PROCEEDINGS

*NOVA SCOTIAN HOTEL / **HALIFAX***  *SEPTEMBER 15-18, **1963***

PROCEEDINGS

Twentieth Annual Conference

of the

Provincial Ministers of Mines

SEPTEMBER 15th, to 18th, 1963

NOVA SCOTIAN HOTEL

Halifax, Nova Scotia

Chairman of the Conference

THE HONOURABLE DONALD M. SMITH

Minister of Mines

PROVINCE OF NOVA SCOTIA

Vice-Chairman

DR. J. P. NOWLAN

Deputy Minister of Mines

TABLE OF CONTENTS

DATES AND PLACES
of the
ANNUAL CONFERENCES
of the
PROVINCIAL MINISTERS OF MINES

CONFERENCE	DATE	PLACE
First	April 14 - 16, 1945	Quebec, P. Q.
Second	November 22 - 23, 1945	Toronto, Ontario
Third	September 23 - 27, 1946	Winnipeg, Manitoba
Fourth	September 3 - 5, 1947	Keltic Lodge, Nova Scotia
Fifth	September 2 - 4, 1948	Jasper, Alberta
Sixth	September 7 - 10, 1949	Fredericton, New Brunswick
Seventh	September 13 - 16, 1950	Victoria, British Columbia
Eighth	September 4 - 8, 1951	Saskatoon, Saskatchewan
Ninth	September 15 - 17, 1952	Quebec, P. Q.
Tenth	September 16 - 18, 1953	Niagara Falls, Ontario
Eleventh	September 20 - 22, 1954	Winnipeg, Manitoba
Twelfth	September 12 - 14, 1955	Keltic Lodge, Nova Scotia
Thirteenth	September 10 - 12, 1956	Lake Louise, Alberta
Fourteenth	September 4 - 6, 1957	Vancouver, British Columbia
Fifteenth	September 3 - 5, 1958	St. Andrews, New Brunswick
Sixteenth	September 14 - 16, 1959	Regina, Saskatchewan
Seventeenth	October 16 - 19, 1960	Quebec, P. Q.
Eighteenth	September 17 - 20, 1961	Toronto, Ontario
Nineteenth	September 16 - 18, 1962	Winnipeg, Manitoba
Twentieth	September 15 - 18, 1963	Halifax, Nova Scotia

PROVINCIAL MINISTERS OF MINES AND DEPUTY MINISTERS AT THE TIME OF THE TWENTIETH ANNUAL CONFERENCE OF MINISTERS OF MINES

MINISTERS

Honourable W. J. Keough	Minister of Mines and Resources, Newfoundland
Honourable D. M. Smith	Minister of Mines, Nova Scotia
Honourable Leo F. Rossiter	Minister of Industry and Natural Resources, Prince Edward Island
Honourable H. G. Crocker	Minister of Lands and Mines, New Brunswick
Honourable Rene Levesque	Minister of Natural Resources, Quebec
Honourable G. C. Wardrope	Minister of Mines, Ontario
Honourable C. H. Witney	Minister of Mines and Natural Resources, Manitoba
Honourable A. G. Kuziak	Minister of Mineral Resources, Saskatchewan
Honourable A. R. Patrick	Minister of Mines and Minerals, Alberta
Honourable W. K. Kiernan	Minister of Mines and Petroleum Resources, British Columbia

DEPUTY MINISTERS

Mr. Fred Gover	Newfoundland
Dr. J. P. Nowlan	Nova Scotia
Mr. P. A. Murnaghan	Prince Edward Island
Mr. K. B. Brown	New Brunswick
Dr. P. E. Auger	Quebec
Mr. D. P. Douglass	Ontario
Mr. Stuart Anderson	Manitoba
Mr. A. J. Williams	Saskatchewan
Mr. H. H. Somerville	Alberta
Mr. P. J. Mulcahy	British Columbia

CONFERENCE ORGANIZING COMMITTEE

CHAIRMAN

Honourable D. M. Smith
Minister

Vice-Chairman and Secretary

Dr. J. P. Nowlan
Deputy Minister

Co-Ordinator

Mr. Sydney C. Mifflen

Ladies Committee

Mrs. E. D. Brown, Chairman
Mrs. C. B. Hume — Mrs. J. P. Nowlan
Mrs. D. M. Smith

Editor of Proceedings

Dr. J. P. Nowlan

Transportation

Mr. Roy Slater

Registrars and Secretariat

Mrs. D. M. Wolfe, Chief
Miss E. Chase — Miss E. Johnson
Miss M. MacSween — Miss L. Ross

COMMITTEES

Committee No. 1 — Problems Relating to Mining Operations

Co-Chairmen: Mr. F. Gover
Deputy Minister
Department of Mines and Resources
Newfoundland

Mr. D. P. Douglass
Deputy Minister
Department of Mines
Ontario

Agenda:

(a) Use of Ammonium Nitrate as an Underground Blasting agent.
(b) Report of Sub-Committee on Silicosis and Medical Examination of Miners.
(c) Safety rules governing Surface Construction on Mining Properties.
(d) Non-destructive Testing of Mine Hoisting Ropes.

Committee No. 2 — Problems Relating to Geology, Geophysics, and Prospecting

Chairman: Dr. P. E. Auger,
Deputy Minister
Department of Natural Resources,
Quebec

Agenda:

(a) Review of Provincial Legislation affecting Prospecting.
(b) Review of progress on the Collection and Preservation of Exploration data.
(c) Review of Regulations governing Prospecting and Mining in Provincial and Federal Parks, Recreation Areas, Mining Establishments, etc.
(d) Regulations regarding Surveys of Claims and Claim Grouping.
(e) Discussion as to Uniformity in Compilation of Geological and Geophysical data.
(f) Professional Status of Geologists submitting reports relative to Assessment Work.

Committee No. 3 — Royalties, Taxation and Tariffs

Chairman: Mr. A. J. Williams
Deputy Minister
Department of Mineral Resources
Saskatchewan

Agenda:

(a) Mineral Statistics Report — Dominion-Provincial liaison.
(b) Review of Income Tax Regulations concerning Federal Income Tax allowance for Royalty and Mining Tax Payments.
(c) Review of revised "Short Digest and Mining Tax Base in each of the several Provinces".
(d) Emergency Gold Mines Assistance Act.
(e) New Business.

Committee No. 4 — Coal

Chairman: Dr. J. P. Nowlan
Deputy Minister
Department of Mines
Nova Scotia

Agenda:

(a) Need of Clarification in the application of Order-in-Council No. P.C. 1963-957 dated June 25, 1963.
(b) Promotion of Electric Heating.
(c) Other items as may properly be placed before the Committee.

Committee No. 5 — Petroleum and Natural Gas

Co-Chairmen: Mr. P. J. Mulcahy
Deputy Minister
Department of Mines and Petroleum Resources
British Columbia

Mr. H. H. Somerville
Deputy Minister
Department of Mines and Minerals
Alberta

Agenda:

1. Minutes of meeting held in Calgary, May 24, 1963.
2. Report of Technical Sub-Committee:
   (a) Progress of Sub-Committee
   Reserves
   Regulatory Practices
   Multiple Completions
   Statistical
   Legal
   Uniform Nomenclature Petroleum Products
   (b) Future projects.
3. Study regarding Conservation in relation to Economics.
4. Report of Lands Sub-Committee:
   (a) The Model Gas Storage Act
   (b) The Model Oil and Gas Unitization Act
   (c) The Model Oil and Gas Well Property Act.
   (d) Study regarding Provincial Mechanics Liens Act.
   (e) Future projects
5. 5. Review by Federal and Provincial Representatives of Oil and Gas Legislation passed in the preceding year.
6. Films.
   "The Athabasca Tar Sands
   presented by Cities Service Athabasca, Inc.
   "Conquest of the Deep", a film on off-shore drilling, presented by Shell Oil Company.
7. Other business.

Committee No. 6 — Education

Chairman: Mr. Stuart Anderson
Deputy Minister
Department of Mines and Natural Resources.
Manitoba

Agenda:

(a) Report of the Secretary.
(b) Discussion of the Field of Activity of the Committee.
(c) Public relations.
(d) Other matters that may be referred to the Committee by the Ministers or brought up from the floor.

LIST OF DELEGATES REGISTERED AT THE MINES MINISTERS' CONFERENCE

ALBERTA

Patrick, Hon. A. R.	Minister of Mines and Minerals, Edmonton
Somerville, H. H.	Deputy Minister of Mines and Minerals, Edmonton
Acorn, G. W.	Department of Mines and Minerals, Edmonton
Berry, A. L.	Department of Mines and Minerals, Edmonton
Blenrud, O. H.	Socony Mobil Oil of Canada Ltd., Calgary
Booth, Harry	Pembina Pipe Line Ltd., Calgary
Bordula, A. L.	Shell Oil Company of Canada, Limited, Calgary
Bredin, E. M.	Socony Mobil Oil of Canada Ltd., Calgary
Christian, E. W.	Imperial Oil Limited, Edmonton
Clark, W. D.	Cities Service Athabasca Inc., Edmonton
Connor, E. J.	Union Oil Co. of Canada Ltd., Calgary
Corbet, J. B.	Canadian Petroleum Association, Calgary
Dutton, J. A.	Department of Mines and Minerals, Edmonton
Fraser, S. A.	Alberta Coal Ltd., Calgary
Fuller, K. W.	Oil and Gas Conservation Board
Galvin, E. A.	Medallion Petroleums Ltd., Calgary
Govier, G. W.	Oil and Gas Conservation Board, Calgary
Hardy, J. F.	Central Del Rio Oils Ltd., Calgary
Hay, Charles	Royalite Oil Co. Ltd., Calgary
Kelly, Fred	Imperial Oil Limited, Calgary
Knox, G. R.	The California Standard Co., Calgary
Lee, C. S.	Western Decalta Petroleum Ltd., Calgary
Lee, John E.	Consumers Gas Company Ltd., Toronto
Lewis, D. E.	Imperial Oil Ltd., Calgary
Mitchell, D. E.	Great Plains Development Co. of Canada, Ltd., Calgary
Mitchell, H.	Mitchell and Associates, Edmonton
McDonald, Paul C.	Murphy Oil Co. Ltd., Calgary
MacKenzie, W. D. C.	Imperial Oil Ltd., Calgary
MacLeod, N. A.	Oil and Gas Conservation Board, Calgary
Patrick, J. W.	Department of Mines and Minerals, Edmonton
Proctor, J. W.	Canadian Petroleum Association, Calgary
Redmond, J. F.	Shell Oil Company of Canada, Limited, Calgary
Richardson, C. A.	Toronto-Dominion Bank, Halifax, N. S.
Rudolph, J. C.	Banff Oil Ltd., Calgary
Seaton, R. A.	Department of Mines and Minerals, Edmonton
Smith, D. W.	Field Title Service, Calgary
Stabback, J.	Oil and Gas Conservation Board, Calgary
Stuart, G. C.	Hudson's Bay Oil & Gas Company Ltd., Calgary
Stuart, W. D.	Canadian Petroleum Association, Ottawa
Swann, R. H.	Canadian Fina Oil Limited, Calgary
Tocher, J. D.	King-Stevenson Gas & Oil Co., Calgary
Westfall, M. F.	Husky Oil Canada Ltd., Calgary
Whittaker, W. C.	Coal Operator's Assoc. of Western Canada, Calgary
Wynne, C. A.	Atlantic Refining Co., Calgary

BRITISH COLUMBIA

Mulcahy, P. J.	Deputy Minister of Mines and Petroleum Resources, Victoria
Brett, F.	Sinclair Canada Oil Co., Calgary, Alta.
Elliott, T.	B. C. and Yukon Chamber of Mines, Vancouver
Funkhouser, E. M.	The Pure Oil Company, Calgary, Alta.
Gadbois, R. N.	Shell Oil Company of Canada, Limited, Calgary, Alta.
Glenn, Wayne E.	Hudson's Bay Oil & Gas Company Ltd., Calgary, Alta.
Huestis, H. H.	Bethlehem Copper Corp. Ltd., Vancouver
Lineham, J. S.	Department of Mines & Petroleum Resources, Victoria
Mitchell, C. H.	Mining Assoc. of British Columbia, Vancouver
McGillivray, G. B.	Canadian Petroleum Assoc., Victoria
Peck, J. W.	Department of Mines & Petroleum Resources, Victoria
Rasmussen, L. M.	Pacific Petroleums Ltd., Calgary
Sargent, Dr. H.	Department of Mines & Petroleum Resources, Victoria
Scott, E. W.	Union Oil Co. of Canada Ltd., Calgary, Alta.

MANITOBA

Witney, Hon. C. H.	Minister of Mines and Natural Resources, Winnipeg
Anderson, Stuart	Deputy Minister of Mines and Natural Resources, Winnipeg
Davies, J. F.	Department of Mines and Natural Resources, Winnipeg
Duff, J. A.	Canadian National Railways, Winnipeg
Gobert, M. J.	Department of Mines and Natural Resources, Winnipeg
Junker, R. H.	Department of Mines and Natural Resources, Winnipeg
Morrice, W. A.	Hudson Bay Mining and Smelting Co. Ltd., Flin Flon
Richards, J. S.	Department of Mines and Natural Resources, Winnipeg
Roper, J. S.	Mid-West Metal Mining Association, Winnipeg
Todd, F. F.	The International Nickel Company of Canada Ltd., Thompson, Manitoba

NEW BRUNSWICK

Crocker, Hon. H. G.	Minister, Dept. of Lands and Mines, Fredericton
Clements, C. S.	Department of Lands and Mines, Fredericton
Callahan, W. H.	New Jersey Zinc Exploration Co. (Canada)Ltd., New York
Coughlan, E. K.	Department of Lands and Mines, Fredericton
Dumbrille, J. C.	Consulting Engineer, Toronto
Goranson, E. A.	New Jersey Zinc Exploration Co. (Canada) Ltd., Ottawa
Hamilton, John	Department of Lands and Mines, Fredericton
Moore, G. N.	The Consolidated Mining & Smelting Co. of Canada Ltd., Montreal
McCullough, J. G.	Heath Steele Mines, Ltd., Newcastle
O'Leary, L. S.	Department of Lands and Mines, Fredericton
Riddell, J. E.	Mount Pleasant Mines Limited, St. Andrews
Scott, C. E.	Miramichi Lumber Company Limited, Minto
Smith, J. C.	Department of Lands and Mines, Fredericton
Spence, W. I.	Department of Lands and Mines, Fredericton
Sullivan, C. J.	Kennco Explorations (Canada) Limited, Toronto
Tooke, A. M.	Dufferin Mining Ltd., Minto
Vanderbroeck, J. P.	Department of Lands and Mines, Minto
Warren, R. W.	Department of Lands and Mines, Fredericton

NEWFOUNDLAND

Keough, Hon. W. J.	Minister, Dept. of Mines, Agriculture & Resources, St. Johns
Gover, Fred	Deputy Minister, Dept. of Mines, Agriculture & Resources, St. Johns
Abdnor, J. S.	Pickands, Mather & Co., Cleveland, Ohio
Carter, Frank H.	Wabush Mines, Pichands, Mather & Co., Montreal
Howse, C. K.	Iron Ore Company of Canada, St. Johns
Macdonald, R. D.	Labrador Mining & Exploration Co., Ltd., Montreal
McInnes, Robert	Pickands, Mather & Co., Cleveland, Ohio

NOVA SCOTIA

Smith, Hon. D. M.	Minister, Department of Mines, Halifax
Nowlan, Dr. J. P.	Deputy Minister, Department of Mines, Halifax
Avard, Dr. N. T.	Retired Coal Operator, Amherst
Bridle, C. C.	Magnet Cove Barium Corp., Walton
Brown, E. D.	National Gypsum (Canada) Ltd., Dartmouth
Burchell, David	Bras d'Or Coal Company, Bras d'Or
Burrill, L. E.	Domtar Chemicals Ltd., Sifto Salt Div., Amherst
Cameron, E. L.	Nova Scotia Technical College, Halifax
Cunningham, C. D.	Dominion Steel & Coal Corp. Ltd., Montreal, Que
Evans, Dean	Evans Coal Mine Ltd., St. Rose
Evans, R. E.	Henry J Kaiser Co. (Canada) Ltd., Montreal, Que.
Flemming, W. C.	Little Narrows Gypsum Co., Little Narrows
Girroir, E. L.	Department of Mines, Halifax
Gordon, H. C. M.	Dominion Steel & Coal Corp. Ltd., Sydney
Goudge, M. G.	Department of Mines, Halifax
Grant, R. I.	Bestwall Gypsum Company, Port Hawkesbury
Hindson, R. D.	Steel Company of Canada, Hamilton, Ont.
Holbrook, Dr. G. W.	Nova Scotia Technical College, Halifax
Jones, F. S.	Canadian Industries Limited, Halifax
King, M. E.	Fundy Gypsum Company Limited, Windsor
Marshall, H. A.	Imperial Oil Limited, Halifax
Mifflen, S. C.	Retired, Antigonish
Monture, Dr. G. C.	Atlantic Development Board, Ottawa
Morgan, J. H.	Consulting Geologist, Montreal, Que.
Morris, R.	Mines Safety Appliances Co. Ltd., Toronto, Ont.
MacMillan, D. M.	Mines Safety Appliances Co. Ltd., Bedford
MacQuarrie, J. R.	Canadian Rock Salt Company, Pugwash
MacRae, L.	Department of Mines, Halifax
Row, W. S.	Canadian Metal Mining Association, Toronto, Ont.
Selwyn, J. C.	Canada Cement Co. Ltd., Montreal, Que.
Shea, F. S.	Department of Mines, Halifax
Slater, Roy	Department of Mines, Halifax
Weeks, Dr. E. P.	Atlantic Development Board, Ottawa
Wright, Dr. J. D.	Department of Mines, Halifax

ONTARIO

Douglass, D. P.	Deputy Minister, Department of Mines, Toronto
Bawden, W. E.	Department of Mines, Toronto
Beattie, J.	Ontario Mining Association, Toronto

Brittain, W. D.	Department of Energy Resources, Toronto
Brown, L. C.	Department of Mines, Toronto
Buckles, H. R.	Rio Tinto Canadian Exploration Ltd., Toronto
Colpitts, G. L.	Imperial Oil Limited, Chatham
Crayston, E. G.	Ontario Mining Association, Toronto
Douglass, J. H.	A. D. Margison & Assoc. Ltd., Don Mills
Dyer, W. B.	Union Gas Co. of Canada Ltd., Chatham
Escoffery, B. M.	Trans-Canada Pipe Lines, Toronto
Fraser, H. J.	Falconbridge Nickel Mines Ltd., Toronto
Gerow, C.	The Canadian Institute of Mining and Metallurgy, Montreal
Hall, R. G.	Halliburton Company, Sarnia
Hilliard, T. R.	Department of Energy Resources, Toronto
Hurst, M. E.	Department of Mines, Toronto
Johnston, D. M.	Trans-Canada Pipe Lines Ltd., Toronto
Kilgour, H. W. D.	Imperial Oil Limited, Toronto
Kostuik, J.	Denison Mines Ltd., Toronto
Lee, B. C.	Department of Mines, Toronto
MacKay, A. E.	Elgin Petroleum Corporation, Rodney
Mackenzie, B. H.	Imperial Oil Limited, Toronto
O'Connor, L. G.	The Gas & Petroleum Association of Ontario, Don Mills
O'Shea, H.	H. O'Shea & Associates Ltd., London
Perry, E. A.	Hollinger Consolidated Gold Mines Ltd., Timmins
Roliff, W. A.	Imperial Oil Limited, Toronto
Scott, R. V.	Department of Mines, Toronto
Sharp, D. A.	Department of Energy Resources, Toronto

SASKATCHEWAN

Kuziak, Hon. A. G.	Minister of Mineral Resources, Regina
Williams, A. J.	Acting Deputy Minister of Mineral Resources, Regina
Barker, R. A.	Southwest Potash Corp., Toronto, Ont.
Brandt, D.	Trans-Prairie Pipe Lines Ltd., Edmonton, Alta.
Cheesman, Dr. R. L.	Department of Mineral Resources, Regina
Coons, R. M.	Department of Mineral Resources, Regina
Dahl, A. R.	Department of Mineral Resources, Regina
Davidson, C. R.	Alwinsal Potash of Canada Ltd., Regina
Doerr, C. F.	Utility Coals Ltd., Estervan
Drees, F. K.	Associated Mining Construction Ltd., Regina
Edmonds, B. P.	Kalium Chemicals, Regina
Erbarth, W.	Alwinsal Potash of Canada Ltd., Regina
Furlong, D.	Producers Pipe Lines, Regina
Green, W. H.	Gibson Petroleum Co. Ltd., Calgary, Alta.
Jack, P. S.	Potash Company of America, Saskatoon
Lambillotte, John	Kalium Chemicals Ltd., Regina
Mermet, M. L.	Alwinsal Potash of Canada Ltd., Regina
Mode, D.	Department of Mineral Resources, Regina
Monsaroff, A.	Domtar Chemicals Ltd., Montreal, Que.
McGowan, T.	Department of Mineral Resources, Regina
MacNicol, J. M.	Canadian Petroleum Association, Regina
McPherson, R. L.	Department of Mineral Resources, Regina
Rowbottom, T. E.	Domtar Chemicals Ltd., Montreal, Que.

Rupf, J. A.	South Saskatchewan Pipe Line Co., Regina
Seibert, K.	Sybouts Sodium Sulphate Co. Ltd., Gladmar
Semple, E. L.	Consultant, 3006 Assiniboine Ave., Regina
Smith, J. P.	U. S. Borax & Chemical Corp., Los Angeles, California
Tamaki, T.	Department of Mineral Resources, Regina
Thomson, C. M.	Manitoba & Saskatchewan Coal Company (Limited), Winnipeg, Manitoba
Tyerman, D. M.	MacPherson, Leslie & Tyerman, Regina
Upham, M. A.	International Minerals & Chemical Corporation (Canada) Ltd., Esterhazy
Wents, J. H., Jr.	Tidewater Canadian Oil Ltd., Regina
Wotherspoon, J. G.	Department of Mineral Resources, Regina

QUEBEC

Auger, Dr. P. E.	Deputy Minister of Natural Resources, Quebec
Bellemare, Maurice	Department of Natural Resources, Quebec
Campbell, I. C.	Asbestos Corporation Ltd., Thetford Mines
Cote, J.	Department of Natural Resources, Quebec
Dempsey, R. W.	Malartic Gold Mines, Ltd., Malartic
Fafard, J.	Department of Natural Resources, Quebec
Farnsworth, D. A.	Department of Natural Resources, Quebec
Filteau, P. A.	Quebec Asbestos Mining Association, Quebec
Foley, A. W.	Quebec Metal Mining Association, Quebec
Grenier, P. E.	Department of Natural Resources, Quebec
Langlois, G.	Quebec Metal Mining Association, Quebec
Larochelle, Eugene	Quebec Metal Mining Association, Quebec
McManus, C. E.	Quebec Metal Mining Association, Quebec
Ralston, K. M.	Canadian National Railways, Montreal
Riverin, Paul E.	St. Lawrence Columbium & Metals Corp., Montreal
Roy, R.	Department of Natural Resources
Smith, George W.	Bell Asbestos Mines, Thetford Mines

FEDERAL

Benidickson, Hon. W. M.	Minister of Mines and Technical Surveys, Ottawa
van Steenburgh, W. E.	Deputy Minister of Mines and Technical Surveys, Ottawa
Andrews, G. W.	Dominion Bureau of Statistics, Ottawa
Beard, W. J.	Department of Mines and Technical Surveys, Ottawa
Buck, W. K.	Department of Mines and Technical Surveys, Ottawa
Deir, A. R.	Dominion Bureau of Statistics
Harrison, Dr. J. M.	Geological Survey of Canada
Hodgson, E. C.	Department of Mines and Technical Surveys, Ottawa
Hopper, W. H.	National Energy Board, Ottawa
Howland, R. D.	National Energy Board, Ottawa
Hunt, A. D.	Department of Northern Affairs & National Resources, Ottawa
Jordan, A. T.	Department of Northern Affairs & National Resources, Ottawa
O'Brian, C. L.	Dominion Coal Board, Ottawa
Scotland, W. A.	National Energy Board
Toombs, R. B.	Department of Mines & Technical Surveys, Ottawa
Troy, Orval	Department of Mines & Technical Surveys, Ottawa

LIST OF LADIES PRESENT

ALBERTA

Booth, Mrs. Harry	Calgary	Lee, Mrs. C. S.	Calgary
Bredin, Mrs. E. M.	Calgary	Mitchell, Mrs. H.	Edmonton
Christian, Mrs. E. W.	Edmonton	Patrick, Mrs. A. R.	Edmonton
Connor, Mrs. Eric J.	Calgary	Richardson, Mrs. C. A.	Halifax
Galvin, Mrs. E. A.	Calgary	Rudolph, Mrs. J. C.	Calgary
Govier, Mrs. G. W.	Calgary	Stuart, Mrs. G. C.	Calgary
Hardy, Mrs. J. F.	Calgary	Swann, Mrs. R. H.	Calgary
Kelly, Mrs. Fred	Calgary	Tocher, Mrs. J. D.	Calgary
Knox, Mrs. G. R.	Calgary	Wynne, Mrs. C. A.	Calgary

BRITISH COLUMBIA

Brett, Mrs. F.	Calgary	Mulcahy, Miss Denise	Victoria
Funkhouser, Mrs. E. M.	Calgary	McGillivray, Mrs. G. B.	Victoria
Gadbois, Mrs. R. N.	Calgary	Rasmussen, Mrs. L. M.	Calgary
Glenn, Mrs. Wayne E.	Calgary	Scott, Mrs. E. W.	Calgary
Huestis, Mrs. H. H.	Vancouver		

MANITOBA

Morrice, Mrs. W. A.	Flin Flon	Roper, Mrs. J. S.	Winnipeg

NEW BRUNSWICK

Clements, Mrs. C. S.	Fredericton	Scott, Mrs. C. E.	Minto
Dumbrille, Mrs. J. C.	Toronto	Smith, Mrs. J. C.	Fredericton
Hamilton, Mrs. John	Fredericton	Tooke, Mrs. A. M.	Minto
Moore, Mrs. G. N.	Montreal	Vanderbroeck, Mrs. J. P.	Minto
McCullough, Mrs. J. G.	Newcastle		

NEWFOUNDLAND

Howse, Mrs. C. K.	St. Johns	Macdonald, Mrs. R. D.	Montreal

NOVA SCOTIA

Bridle, Mrs. C. C.	Walton	MacMillan, Mrs. D. M.	Bedford
Brown, Mrs. E. D.	Dartmouth	MacQuarrie, Mrs. J. R.	Pugwash
Burchell, Mrs. D.	Bras d'Or	MacRae, Mrs. L.	Halifax
Cameron, Mrs. E. L.	Halifax	Nowlan, Mrs. J. P.	Halifax
Girroir, Mrs. E. L.	Halifax	Row, Mrs. W. S.	Toronto
Goudge, Mrs. M. G.	Halifax	Shea, Mrs. F. S.	Stellarton
Grant, Mrs. R. I.	Port Hawkesbury	Slater, Mrs. Roy	Halifax
Jones, Mrs. F. S.	Halifax	Smith, Mrs. D. M.	Halifax
Morris, Mrs. R.	Toronto	Wright, Mrs. J. D.	Halifax

ONTARIO

Bawden, Mrs. W. E.	Toronto
Beattie, Mrs. J.	Toronto
Brittain, Mrs. W. D.	Toronto
Brown, Mrs. L. C.	Toronto
Buckles, Mrs. H. R.	Toronto
Colpitts, Mrs. G. L.	Chatham
Douglass, Mrs. D. P.	Toronto
Escoffery, Mrs. B. M.	Toronto
Frasher, Mrs. J. H.	Toronto
Gerow, Mrs. C.	Montreal
Johnston, Mrs. D. M.	Toronto
Kilgour, Mrs. H. W. D.	Toronto
Kostuik, Mrs. J.	Toronto
MacKay, Mrs. A. E.	Rodney
O'Shea, Mrs. H.	London
Roliff, Mrs. W. A.	Toronto
Scott, Mrs. R. V.	Toronto

SASKATCHEWAN

Brandt, Mrs. D.	Edmonton
Cheesman, Mrs. R. L.	Regina
Coons, Mrs. R. M.	Regina
Dahl, Mrs. A. R.	Regina
Furlong, Mrs. D.	Regina
Green, Mrs. W. H.	Calgary
McGowan, Mrs. T.	Regina
MacNicol, Mrs. J. M.	Regina
Seibert, Mrs. K.	Wilmington, Del.
Semple, Mrs. E. L.	Regina
Thomson, Mrs. C. M.	Winnipeg
Tyerman, Mrs. D. M.	Regina
Upham, Mrs. M. A.	Esterhazy
Wents, Mrs. J. H., Jr.	Regina

QUEBEC

Dempsey, Mrs. R. W.	Halet
McManus, Mrs. C. E.	Sept. Iles
McManus, Miss Mary	Sept. Iles
Smith, Mrs. G. W.	Quebec

FEDERAL

O'Brian, Mrs. C. L.	Ottawa

OPENING PLENARY SESSION

Chairman — Honourable D. M. Smith
Minister of Mines of the
Province of Nova Scotia

September 16, 1963, 10:30 a.m.

The Meeting was addressed by the Chairman as follows:

It gives me great pleasure to welcome the Provincial Mines Ministers, their Deputies and the delegates from the mining industry to this the 20th Annual Conference of the Provincial Mines Ministers. I welcome also the Federal Minister of Mines and the delegation of observers from his staff and from the Department of Northern Affairs and Natural Resources.

This is the third time that this Conference has assembled in Nova Scotia and the first time in Halifax. Apart from the schedule of work which lies before each of us we have tried to provide some interesting social events both for the ladies and those delegates who have the spare moments to participate. Many of the events were made possible by the cooperation and assistance of companies active in the mining industry of Nova Scotia as may be noted on your programs. If any other activities would appeal to one or more of you, please feel free to contact any of our Committee Members regarding arrangements.

Mr. Stewart Anderson of the Nova Scotia Information Service will be acting as Press liaison with Dr Nowlan, my Deputy. A stenographic workshop has been set up in Room 243 and the necessary services wil be available throughout the Conference.

The 20th Provincial Mines Ministers' Conference now assembled in Nova Scotia comes at an auspicious moment of our long mining history. As you are aware the mineral production per square mile from this Province has exceeded by a large margin that of any other Province. The records of the Department of Mines go back to 1860, well prior to Confederation and immediately subsequent to the placing of mineral rights in the Crown as represented by the Provincial Government rather than in the hands of disinterested grantees.

While the early statistics of production are sketchy, we have complete figures except for such minerals as were illegally disposed of since the early 1890's. In this Century we have passed a $2,000,000,000 recorded production value during the present year or somewhere around $93,000.00 per square mile of area. This year, if the trend continues, also marks the first upturn in coal output for several years, and may mark an all time high in overall mineral value. It certainly will mark an all time high in exploration expenditures as recorded for the figures are already above those for 1962, which in itself represented a new high mark in exploratory effort.

Why do these two high marks coincide. General economic conditions, helped to some extent by last year's devaluation of the Canadian dollar, explains much of the surge in mineral output. The increased exploration activity is in turn due to the recognition by mining capital that this Province is underexplored mineralwise and possesses extremely complicated geological conditions, together with numerous mineral showings, that were never correlated with structural or geochemical controls.

Metallic mineral deposits are now known to be possible in every age of rock known to occur on the peninsula. Whether the ages of origin differ is not known, but in age of containing rock these deposits range from the Pre-Cambrian George River Series to the Triassic Volcanics. Industrial minerals on the other hand are likely only in the rocks younger than Silurian.

It is the hope of the Nova Scotia Department of Mines that the confidence of capital will be justified both by ore deposits that will be developed and by a political climate that is conducive to continuing investment in the Province. The Department stands ready to give all the technical assistance within its power to serious explorers and operators. Not the least form of such assistance is the maintenance of maps and records of work done in the past. We hope also within the next year to have an indexed diamond drill core library in Stellarton as a basic guide to the study of drill hole sections in the future.

Last year at Winnipeg for the first time the Honourable the Minister of Mines for Canada read the reply of the Canadian Government to the resolutions presented to Ottawa arising from the 18th Conference. This method of formal reply was so well received that I asked Hon. Mr. Benidickson if he would favor us with his presence and give the reply to those resolutions presented to the Federal Government last year. Mr. Beneddickson kindly consented to undertake this task and is with us today. I therefore am pleased to introduce to you the Hon. W. M. Benidickson, Minister of Mines for Canada, who will advise us as to the action taken by his Government with regard to the resolutions passed at this Conference last year — Mr. Benidickson.

REPLY TO THE BRIEF SUBMITTED TO THE GOVERNMENT OF CANADA FOLLOWING THE 19TH ANNUAL CONFERENCE OF THE PROVINCIAL MINISTERS OF MINES

To The Provincial Ministers of Mines:

Gentlemen:

I have studied with interest the brief presented to the Government of Canada following your Nineteenth Annual Conference last September. May I say at the outset that your annual meetings and the briefs such as the one recently presented appear to me to be a very logical and practical method for harmoniously introducing problems of the mining industry which exist or may arise between the provincial mines departments and my own Department or other federal Government departments.

The resolutions in your most recent brief have received full and careful consideration from the various departments which are concerned. The views of these departments and, therefore, of the government of Canada, are set down below.

1. Problems Relating to Geology, Geophysics and Prospecting

Your request that the Government of Canada and other authorities having jurisdiction over park areas give favourable consideration to policies, rules and regulations which would ensure against the destruction of such areas but also provide for controlled development of mineral resources in these areas, has been reconsidered. I have consulted my colleague, the Minister of Northern Affairs and National Resources, whose department administers the National Parks Act, with respect to this matter.

It is his feeling that to permit mining activities within the Parks would introduce a foreign principle into the use of National Park resources as set out in the National Parks Act. The intent of the Act is that any man-made modification to a protected area should be for the sole purpose of furthering the objects of the Act, namely the optimum enjoyment and appreciation of the natural beauty of the segment of land concerned.

The view of the present government, like that of its predecessors and also of several provincial governments, is that the benefits which might be gained by the exploitation of mineral resources within National Parks is clearly outweighed by the benefits now provided under the Act.

2. Royalties, Taxation and Tariffs

(a) The Emergency Gold Mining Assistance Act

The approval of the Provincial Ministers of Mines to the continuation of cost aid to the gold mining industry has been noted. The matter of extending the Act beyond the calendar year 1963 has been under study for some time and I plan to make an announcement on the subject during the fall session of Parliament.

(b) Section 701, Income Tax Act

Requests by representatives of the mining industry for re-examination and further revision of the rules governing the proportion of mining taxes paid to a province, which may be allowed as a deduction in computing federal income tax, have been studied. However, no change is anticipated at this time.

(c) Secondary Processing

The Government of Canada recognizes the desirability and importance of encouraging the growth of the secondary processing of mineral raw materials in this country. We shall endeavour to assist the mineral processing industry in this respect wherever feasible.

3. Coal

The fullest consideration was given on these two resolutions which, in effect, request that assistance on Canadian coal be continued.

Effect has been given to these requests by the passing of Orders in Council that provide for assistance on the movements of Canadian coal in the amounts necessary to meet the competition of imported coal and of imported residual oil. These Orders in Council continue in effect without any termination date and until changing circumstances require that they be amended.

In order to provide assurance of continuity of this assistance, legislation is being introduced which will authorize the payment of the amount of assistance deemed necessary under the present subvention policy for a term of five years from April 1, 1964. During this five-year period consideration will be given to the longer term future of the Canadian coal industry.

The expression by the Provincial Ministers of their appreciation of the assistance given to the coal industry are gratefully acknowledged.

4. Petroleum and Natural Gas

With reference to the recommendation adopted by the Conference concerning a uniform pressure base of 14.65 psi for determining measurement of natural gas, I have consulted with my colleague, the Minister of Trade and Commerce, to whom the National Energy Board reports. I find that in addition to the National Energy Board, the following organizations either use or favour the 14.73 base: the Canadian Gas Association, major Ontario distributors of natural gas, the Dominion Bureau of Statistics, the Federal Power Commission in the United States, and the American Gas Association. The American Gas Association changed recently from a 14.65 to a 14.73 base.

In view of the widespread use of the 14.73 base, both nationally and internationally, the Minister of Trade and Commerce joins me in suggesting that the Provincial Mines Ministers reconsider the matter of a pressure base for reporting gas production and sales. It is further suggested that officials of the Canadian Gas Association be invited to attend the next meeting of the Conference to support their contention that the 14.73 base be maintained. I am advised that the National Energy Board could also be represented if it meets with the approval of Provincial Mines Ministers.

I am pleased to have had this opportunity to convey to the Mines Ministers of the Provinces the federal government's current views on the problems introduced. As our nation grows and her economy expands, there will undoubtedly arise further differences and problems. I hope that this means of direct communication and the cordial relationship, which has existed over the years, will continue and that solutions which are mutually satisfactory to all can be reached in the friendly spirit so typical of the mining fraternity.

You may rest assured that I shall endeavour to assist you in every way possible during my tenure of office in order to encourage orderly expansion of the Canadian mineral industry and a continuance of our pleasant relations.

Respectfully submitted,

Wm. M. Benidickson,
Minister of Mines and Technical Surveys.

The Chairman then thanked Mr. Benidickson and introduced Dr. Geo. Holbrook, President of the Nova Scotia Technical College, who addressed the meeting as follows:

AN ADDRESS BY DR. G. W. HOLBROOK, PRESIDENT, NOVA SCOTIA TECHNICAL COLLEGE, AT THE PROVINCIAL MINISTERS OF MINES TWENTIETH ANNUAL CONFERENCE

When I was offered this assignment by Dr. Nowlan, the Deputy Minister of Mines for the Province of Nova Scotia, I realized that the only qualifications I had to speak on this subject were, firstly, that I knew nothing at all about mining, and secondly, having only been in Halifax for two years, I really know very little about the Maritimes. Consequently, Mr. Minister, I would beg to be excused from answering questions on either of these topics. My own personal concern with mining and with the mining engineer, is associated, of course, with the field of education, so I will ask you to bear with me if I tend to present the educators point of view rather than that of a mining engineer. From the educators view point, the most outstanding feature about mining engineering, and one which is presently our chief concern, is the dwindling numbers of undergraduate students that are now registering in this discipline. I imagine that this feature is also of some concern to management in the mining field. However, I feel that your concern will be much deeper than mine in the near future, when this dwindling supply of mining engineers makes itself felt upon your industry, and I would like to return to this point somewhat later on in my presentation. For my own benefit, as much as anyone else's, I would like to clarify the position of the mining engineer within the engeral scheme of things. To the outside observer, it would appear that the mining engineer, at least in his embryo state at the university, is being asked to become a jack-of-all-trades. I do not imply, by this, that he will inevitably become a master of none, but I believe that from the outset we should realize that he **cannot** be a master of all.

Some eighteen months ago I was privileged to listen to a paper presented by Professor A. V. Corlett of the Department of Mining Engineering at Queen's University, in which he outlined the scope of mining engineering education. He defined three main phases of the work of the mining engineer, and suggested that the mining engineer was basically concerned with the discovery of basic materials, which includes the very broad fields of geology, geophysics, and prospecting; the recovery of these materials, which perhaps is the real essence of mining; and the refining of these materials, which covers the broader fields of ore dressing, extractive metallurgy, and, of course, the delivery of the finished product to the customer. It is evident that these three phases cover practically all of the fields which are taught, in detail, in schools of engineering, and would involve all of the departments of geology, civil, mechanical, electrical, metallurgical and chemical engineering, as well as certain elements of what might be termed "industrial engineering" and "business and engineering." I do not believe that any one young man, at the undergraduate level can enter all of these broad areas with anything but a nominal depth of understanding. While I do not wish to go into the well worn discussion of the differences between basic and applied research, I would like to point out that research, certainly from the engineer's point of view, may well involve all facets of fundamental research, applied research, development, and even operations research, at the management level. It seems to me that mining research appears to be three dimensional; covering all the areas of the traditional departments of engineering within the engineering school, and at a varying depth, regardless of whether this research be classified as pure or applied or even as development. Incidentally, one good method of determining whether research is pure or applied is to find out who suggested it. If it was conceived by the researcher himself it will doubtless be pure and fundamental – if proposed by someone else it is surely fated to be damned as applied research or even development.

At the national level, I would like to refer to a report to the National Productivity Council on Research and Development in the Canadian Mineral Industry, by Drs. Convey and Hawe, which was published this year. As well as being impressed by the completeness of the factual data in this report, I was particularly interested in one or two figures which, with your permission, I would now like to quote. There is no doubt that the Canadian mineral industry is one of Canada's most valuable assets and represented some 2.6 billion dollars in 1961. Of more significance, however, is that two thirds of the value of the products of this industry are exported from Canada, and in point of fact, make up approximately one third of our total Canadian exports. There is no doubt that the mineral industry is vital to the economy of Canada. On the other hand, it is somewhat depressing to learn that less than 0.9% of the total sales value of this industry is now being spent in research, although it should be pointed out that this low figure is significantly better than the average of Canadian industry as a whole. I was also saddened to read that, of the 35.5 million dollars spent on research in 1961, it would appear that only about 3% of this was spent in universities making the total university support, for research, on the part of the mineral industry, amount to only three quarters of a million, in that year. I would like to return to this distressing state of affairs again later on in my presentation.

I feel that little purpose would be served, here, in my reciting a complete and exhaustive list of research and development projects which are under way, within the Maritime mining industry, however, I do feel that I might make mention of a few typical examples of research and development which are taking place in this area. Under the heading of what might be termed fundamental research, I would like to call attention to the deep hole drilling which is being carried out by the Provincial Department of Mines at Oldham, which has now reached a depth of one thousand feet, with a projected final depth of two thousand five hundred feet. This is being backed up by a similar operation at Dalhousie University where a twelve hundred foot deep hole has now been completed. This work is fundamentally of a geophysical nature and, undoubtedly, will provide a better understanding of the earth's crust in this area. Additionally, of course, the deep hole at Oldham, which is going through various gold bearing structures, may well be of a more practical value in the near future. The Nova Scotia Research Foundation is also involved in fundamental research, and I would like to quote the long term programme, still under way, which is providing a gravity survey of the Province. This is also connected with the seismic measurements which are being conducted on Sable Island, from which it is anticipated that much knowledge will be gained about the thickness of the earth's crust in this area of the continent. Photogrammetry and high level radar surveys of the Province are also being conducted under the sponsorship of the Foundation. The University of New Brunswick is conducting a very interesting programme in the field of geochemistry, in which they are assessing the minerals in the Pennsylvanian type of deposit, with particular reference to the occurrence of trace elements. The majority of research being conducted in the Maritime area, by the universities is, very naturally, of a fundamental nature and very largely within the general field of geology, geophysics, geochemistry and mineralogy.

Other work in the Maritimes which might be classified under the broad heading of development or operations research, should include the development of new separating processes by the Magnet Cove Barium Corporation. This particular example represents a really significant contribution to mining engineering technology on the part of industry. Although each and every mine can be considered as a laboratory, within itself, in which

development work is proceeding at all times. I feel that mention should be made of the development work of the Dominion Steel and Coal Company on the use of flexible steel supports to replace those traditionally of timber. The Department of Mines of the Province of Nova Scotia, in conjunction with the Nova Scotia Research Foundation, has for some years been conducting research in the field of non-destructive testing of mine ropes. This has reached the point where a regular testing programme has been established in the Province by the Department of Mines, and this same Department has sponsored a further research programme, at the Nova Scotia Technical College, the aim of this programme being to develop a reliable and economical device for the continuous monitoring of mine ropes while in operation. A very good example of the co-operation of industry with both the federal and provincial governments, is in the investigation of bumps in coal mines, which is still being actively followed by those agencies and by industry, in Nova Scotia. A piece of fundamental research which has been pursued through to the development stage and has now culminated in a decision to open a cement factory in Brookfield, Nova Scotia, is again, a very good example of co-operation between the Nova Scotia Research Foundation, the Department of Mines and industry, bringing this initial investigation on limestone deposits to a satisfactory conclusion.

Within the area of product processing I would like to bring your attention to a research program which is now under way in the Nova Scotia Technical College, which is providing a new approach to the recovery of copper from low grade ores. This is in every sense a very practical piece of development in which the economics of the process are being considered at every stage of the development work. We are optimistic that the results being produced from this particular venture may well be of value to the copper industry in New Brunswick and elsewhere. One of the few projects at the Nova Scotia Technical College, which is being directly supported by industry, is a research and development programme which is devoted to the classification of asbestos fibres. One of the more novel approaches to this problem, which is sponsored by the Quebec Asbestos Manufacturers Association, is the use of sonic power to separate the various grades of asbestos fibre from the original material, and represents what is a very interesting, and, possibly, profitable break from the conventional processes which have been used up to now. The projects which I have just enumerated by no means represent a comprehensive list of research programmes which are under way within the Maritimes, and I would not want any one group of researchers, in this area, to feel over looked if I have not mentioned the work that they are doing. I have merely tried to pinpoint a few examples of the various types and styles of research which are under way in this area.

A few minutes ago I implied that insufficient money was being spent by the Mining industry on research within the universities. I believe that there is a genuine need for more research in the field of mining to be undertaken at the university level, and that, if this is done, the benefits will be felt by the whole industry. I would suggest that not only must we undertake more research work in the field of mining, but we must also insure that the research in this area is actually labeled "Mining." I appreciate that there are difficulties in providing the appropriate nomenclature in that the field of mining covers such a broad scope of disciplines. Inevitably the detail of the research may fall within a university department which has little or no direct connection with the mineral industry. For example, research at my own College, on asbestos, is involving electronics and acoustics much more than it is the fundamental skills of the mining engineer. Additionally, of course, our programme on non-destructive testing of mine ropes is pointed towards fundamental metallurgy and again, electronics, more than it is towards the traditional concepts of the mining engineer.

In Dr. Convey's report it was brought out that only 2% of the graduate students who are involved in research programmes in the general field of the mineral industry, are working under the heading of mining. I believe that this situation is having a very marked and adverse effect on the recruitment of new undergraduates into the departments of mining engineering right across the continent. There is no doubt that a department of a university which is proceeding with a lively and progressive research programme, involving significant numbers of graduate students, is also a department which is going to appear attractive to the incoming under graduate when he is making up his mind as to which discipline he will undertake during his course at the university. I would like to draw a parallel between the mining industry and what has now been realized by the electric power industry. The number of undergraduate students who are directing their efforts toward the electric power industry has fallen markedly in the last few years and it would appear that only about 10% of the students who are now undertaking electrical engineering, at our universities, are embarked on programmes which will lead them into the power industry field on graduation. The power industry realizes that this is partially due to the fact that most of the research in departments of electrical engineering is now being undertaken under the heading of electronics. It is natural, if the professors within these departments are applying themselves to progressive work in the field of electronics, that, inevitably, the undergraduates within that department will tend to follow in their footsteps. If the professor is to present an attractive image of any particular field of endeavour, it is essential that he should be able to show his students that this field is progressive and one in which he, the professor himself, is vitally interested.

The Nova Scotia Technical College is the only mining school in the Maritime area, and traditionally, the College has, since its founding, been intimately connected with the mining industry. We are, therefore, very concerned that our registration in this field has been dwindling over the last few years, and we are concerned to the point that we are now contemplating offering an additional course, within the Department of Mining, which will be known as Geological Engineering. We feel by so doing we may accomplish two things. Firstly, we believe that although a rose may smell as sweet by any other name, a course labelled Geological Engineering may attract into it young men who are at present not very enchanted by the thought of becoming a miner. Additionally, we feel, that by offering such a course, we are providing the opportunity for the undergraduate student to study at least one facet of mining, and probably one of the more important ones, in much more depth than has been possible in the past. At the same time, we are doing our utmost to increase the amount of research which is going on at the College which can be genuinely labelled Mining Engineering Research, and I would like to suggest to you the thought that such research can best be undertaken when the problems which the graduate student is investigating are live problems and problems provided by industry. While many of the other departments in universities are able to obtain substantial grants-in-aid from such bodies as the National Research Council or the Defence Research Board, there appears to be no federal organization which has available substantial amounts of money to be invested in Mining Research at the universities. Naturally, such research costs money, but I believe that the industry's research dollar, spent within the walls of the university, will probably provide you with far more research per dollar than when spent elsewhere. Research at the university inevitably involves graduate students, and when you support a graduate student to the extent of two to three thousand dollars a year, you are effectively hiring a graduate engineer, who within your own walls, would cost you two to three times that amount. Additionally, you obtain the services of the professor who is directing the graduate student, and it should not be forgotten that this work is being done in laboratories which are established and whose overhead is already being taken care of by the universities themselves. The hundred and fifty per cent tax reduction which is now permitted by the federal government, for research funds spent within the university, means that for most corporations $4.00 worth of research is obtained within the university walls for every dollar spent. Additionally, when you consider that your $4.00 worth in the university is being used to provide what is frequently called slave labour, on the part of the graduate student, and with little or no overhead, I venture to suggest that you are effectively obtaining, for your dollar, ten equivalent dollars worth of research, compared with what you would get within your own establishments. While I appreciate that there are many types of problems which are unsuitable for graduate students to undertake, and while I realize that a normal period of gestation of a research problem for a graduate student, is at least one year, I cannot emphasize too strongly the benefits which will be accrued by both industry and the universities if a higher percentage of your research money is spent in university departments.

I would like to close with the theme that the universities need your support in their research in mining, and that you also need the support of the universities. Money spent in real mining research, at the universities, will not only provide you with a pool of trained engineers for your own research divisions, but also will do much to prevent the extinction of the mining engineering discipline on the university campus. Departments of Mining in universities cannot stand still, they must advance in step with the other departments or they will wither on the vine.

COMMITTEE REPORTS, RECOMMENDATIONS

AND

DECISIONS OF THE MINISTERS

COMMITTEE NO. 1

PROBLEMS RELATING TO MINING OPERATIONS

Co-Chairmen: Mr. F. Gover
Mr. D. P. Douglass

1. **Use of Ammonium Nitrate as an Underground Blasting Agent.**

No resolutions have arisen out of this item, but the Committee would request the Ministers to allow the item to remain on the agenda for future consideration by the Committee.

2. **Report of Sub-Committee on Silicosis and Medical Examination of Miners.**

The Committee recommends that this matter has now been amply dealt with and recommends that it be removed from the agenda.

3. **Safety rules governing Surface Construction on Mining Properties.**

The Committee understands that this was placed on the agenda for purposes of discussion at this Twentieth Conference only. It was discussed and the Committee has nothing to report.

4. **Non-Destructive Testing of Mine Hoisting Ropes.**

No resolutions have arisen out of this item but the Committee would request the Ministers to allow the item to remain on the agenda for future consideration by the Committee.

DECISION OF THE MINISTERS

The Ministers direct that the Sub-committee examining the problems relating to silicosis and Medical Examination of miners be continued.

The balance of the Report is approved.

COMMITTEE NO. 2

Chairman: Dr. P. E. Auger
Secretary: Dr. R. D. MacDonald

PROBLEMS RELATING TO GEOLOGY, GEOPHYSICS, AND PROSPECTING

(a) **Review of Provincial Legislation affecting Prospecting.**

Nova Scotia reports that some amendments have been made regarding the control of beach deposits. Quebec reports a major revision of the Mining Act.

Ontario reports a new bill and a new act dealing with land tenure concerning letters patent and leases and introducing perimeter survey of claim groups. Changes are also made to empower the Department of Mines to grant surface rights to areas lying beyond the claim groups.

Manitoba reports minor amendments dealing with the licensing of claims and changing in assessment requirements pertaining to geophysics.

The other Provinces have no changes to report. It is reported that the Yukon Mining Act will be revised in the near future.

(b) **Review of Progress on the Collection and Preservation of Exploration data.**

In general all the Provinces are satisfied with the collection and preservation of exploration data filed in for assessment work.

There is a diversity of opinions regarding other exploration data in areas lying outside of claims and concessions.

It is recommended that a sub-committee be formed, composed of representatives from the various provincial departments of mines and the mining industry to study during the forthcoming year the advisability of requesting the various exploration groups to submit an annual statement listing the type of exploration work and its location.

(e) **Review of Regulations governing Prospecting and Mining in Provincial and Federal Parks, Recreation Areas, Mining Establishments, etc.**

The resolution based on Committee recommendations is outlined subsequently.

(d) **Regulations regarding Surveys of Claims and Claim Grouping.**

Nothing to report.

(e) **Discussion as to Uniformity in Compilation of Geological and Geophysical data.**

This subject is in progress and various provinces are reporting action.

(f) **Professional Status of Geologists submitting Reports Relative to Assessment Work.**

Topic was considered to be outside the terms of reference of this Committee except for the part dealing with the reports on assessment work.

DECISION OF THE MINISTERS

All items except (c) were adopted as read. The recommendations in (c) were carefully considered and the following resolution based on these recommendations was substituted for this item:

WHEREAS, the resolution with respect to National Parks, passed by the Ministers of Mines at the Nineteenth Annual Conference in Winnipeg, Manitoba, in 1962 was not granted favourable consideration by the Government of Canada; and,

WHEREAS the Ministers of Mines are still of unanimous agreement that controlled mining development in National and Provincial Parks can be compatible with the optium enjoyment of the Parks; and,

WHEREAS it would be of advantage to the Nation to delineate the concept of controlled mining development,

Therefore, be it resolved that a special committee be struck to prepare a brief on the ways and means of controlled development, augmented by any devices deemed necessary to demonstrate the compatibility of such development with the enjoyment of our park areas, to be presented to the Minister of Mines and Technical Surveys of Canada, for his consideration and support.

And further, that the Committee be instructed:

1. To study the present restrictive regulations governing the National Parks solely on the basis of mineral exploration and mining.

2. To devise a well planned publicity campaign so that the public can be informed of the possible financial advantages of new mining operations in park areas with no loss to the beauty of these areas.

3. Meet with the Federal Representatives responsible for the regulations governing the National Parks in order to make a full economic study of the present use being made of National Park areas.

4. To assess the need for exploration in the present National Parks.

A Committee consisting of Mr. Clements, Dr. Douglass and Mr. Mulcahy was instructed to implement the studies and to prepare the material called for in this resolution.

COMMITTEE NO. 3

Chairman: Mr. A. M. Williams

ROYALTIES, TAXATION AND TARIFFS

(a) **Mineral Statistics Report — Dominion-Provincial Liaison.**

A concise report was given by Mr. G. W. Andrews of the Dominion Bureau of Statistics covering the meetings between the Provincial Statisticians and the Bureau since the last Mines Ministers' Conference. He reported considerable progress in the elimination of differences and duplication in statistical reports of the various agencies of Provincial and Dominion Governments. Certain statistical problems such as measurement of production and valuation of copper, lead and zinc still exist. However, many other anomalous situations and differences have been reconciled and real progress was reported in streamlining or statistical reporting procedure to the advantage of the mining industry as a whole. It was also suggested that monthly mineral production statistics might be published by each Province, but after some discussion, it was decided that such problems should be left for further consideration at the Dominion-Provincial Statisticians' meetings.

The Committee recommends that the Mines Ministers:

(a) the Provincial and Dominion statisticians meet every two years with a view to further eliminating duplication and unnecessary reporting by the mineral industry;

(b) the Provincial statisticians be given greater authority to change their method of reporting production figures in order to reach greater uniformity with other provinces and with the Dominion Bureau of Statistics.

(b) **Review of Income Tax Regulations Concerning Dominion Income Tax Allowance for Royalty and Mining Tax Payments.**

The Province of Ontario submitted a brief leading to the recommendation that Regulation 701 under the Dominion Income Tax Act should be repealed and that Section 11 (1) (p) of that Act should be amended to allow mining taxes and royalties, paid to a province, to be allowed in full as a deductible expense. While the Industry's viewpoint on this matter will be fully outlined in the submission presently being prepared by the Canadian Metal Mining Association to the Dominion Royal Commission on Taxation, the Industry as represented by —

Ontario Mining Association
Quebec Asbestos Mining Association
Quebec Metal Mining Association
Mid-West Metal Mining Association
British Columbia Mining Association

went on record as supporting the recommendation.

The Committee therefore passed a motion recommending that the Ministers request the Dominion Government to repeal Section 701 under the Dominion Income Tax Act and amend Section 11 (1) (p) to provide that mining taxes and royalties paid to a province be allowed in full as a deductible expense.

(c) **Review of Revised "Short Digest and Mining Tax Base in each of the Several Provinces".**

The changes in mining tax and royalty bases since the last compilation were submitted at the Committee Meeting. A suggestion was made that the "Digest" did not go far enough in that certain other taxes, such as municipal taxes or grants in lieu thereof assessed in some provinces, were not included in the "Digest". The Committee recommended that the "Digest" in its present form be brought up to date and that 500 copies be printed for the next Conference of the Mines Ministers. Subsequent changes might be handled by way of loose-leaf insertions until a further reprinting becomes necessary.

(d) **Emergency Gold Mines Assistance Act.**

The Committee recommends that the assistance under the Act, which is due to terminate on December 31, 1963, be extended for at least 5 years on a basis that is as least as favourable to the gold mining industry as it is at the present time.

DECISION OF THE MINISTERS

All items were adopted as presented.

Item (d) was considered as of great importance with regard to time and the Chairman of the Conference, Hon. D. M. Smith, was directed to draw this resolution to the attention of the Hon. W. M. Benidickson prior to October 1st, 1963. This resolution was accrodingly transmitted by letter to Mr. Benidickson on September 25, 1963. Acknowledgement of receipt was made by the Hon. W. M. Benidickson on September 30, 1963.

COMMITTEE NO. 3

Appendix "A"

PROVINCE OF ONTARIO PRESENTATION TO THE COMMITTEE ON ROYALTIES TAXATION & TARIFFS RE: REGULATION 701 OF THE FEDERAL INCOME TAX ACT

Section 91 of the B.N.A. Act gives the Government of Canada the exclusive right to raise money by anymode or system of taxation.

Section 92 of the B.N.A. Act gives each province the exclusive right to levy direct taxes.

Section 109 of the B.N.A. Act vests in the provinces all lands, mines, minerals and royalties belonging to the several provinces and all sums that are due and payable for such lands, mines, minerals or royalties at the time of union, subject to any trusts existing in respect thereof, and to any interest other than of the province in the same.

It is obvious that the constitution gave the government of Canada, and **only the Government of Canada,** unlimited rights as to the mode and system of taxation which could be levied; it also is obvious that it was the intention and the spirit of the constitution to give the provinces, and **the provinces only,** the right to levy direct taxes.

Until the year 1916 the Government of Canada confined its taxation to the indirect tax fields; but then, due to its great need for funds, as a result of the first great war, it instituted the business profits tax and in 1917, the income tax, and thus, rightly or wrongly, entered the field of direct taxation.

In determining the amount of taxable income for businesses the Income Tax Act seeks to allow as expense, all legitimate expenses incurred in earning the income, and so in the case of oil and gas royalties, the whole amount of the royalties paid to a province are allowed in computing the income of the producing companies; also, in the case of a mining company which pays royalties to the owner of the mining land, the whole amount of the royalty paid is allowed in computing the income of the mining company. Also, in the case of a mining company which pays royalties to the Crown in the right of any province, where the land and minerals are held under lease from the Crown, the whole amount of the royalty paid to the Crown is allowed in computing the income of the mining company.

Why, then, should regulation 701 seek to limit the amount of royalty which may be allowed as an expense simply because it is collected in the form of a direct tax and on an equitable basis by relating it to the profit of a mining company as determined by the province?

As we know, the B.N.A. Act gave the mines and minerals to the provinces and as we also know, in disposing of these mines and minerals it is impossible for anyone to set a value on the minerals in the ground.

The provinces in many cases, particularly Ontario and Quebec, disposed of the mines and minerals, which have been separated from the Crown, for a nominal sum and, because the value of these lands was unknown, subjected such disposed of lands to a very nominal acreage tax.

Under the B.N.A. Act, where the mines and minerals were disposed of by the provinces, it was not possible to levy an indirect tax or royalty of "x" dollars per ounce of silver, gold, platinum, etc., produced, nor was it equitable to do so.

Thus the province of Ontario in 1907 instituted the Mining Tax Act which levied a tax on the profit derived from the mining of ore or minerals. This was looked upon, variously, as a tax in lieu of Royalty and as a tax on the value of the land for the particular year in which the ore or mineral was produced; in other words, if the profit for the year in question amounted to "x" dollars then the value of the land at the commencement of the following year was "x" dollars and the tax rate would apply as any other property tax. If the province was to set a value on the land owned by the mining company each year then the income tax authorities would allow the tax, paid on such land value — in full — but simply because the value of the land is related to a profit; and, in the case of Ontario an artificial profit figure, the income tax authorities see fit to disallow a part of the tax because the profit upon which it is based is greater than the profit arrived at in accordance with regulation 701.

There are several bonafide reasons why the profit arrived at, under the Mining Tax Act of Ontario, is not the same profit but usually a greater profit than the income arrived at by the income tax authorities under regulation 701.

These are:

1. Mining tax depreciation allowances are not as a rule as great as those allowed by the Federal authorities.
2. Interest is not allowed as an expense by the province.
3. Pre-production expenses are not allowed to be written off for provincial purposes.
4. Many corporate expenses and municipal taxes are not allowed.
5. Exploration and development expenses on other companies' properties are not allowed.
6. Apart from depreciation and development expense only those which occur in the taxation year are considered in arriving at profit.

With regard to section 109 of the B.N.A. Act surely it is apparent that the intention was to allow the provinces to raise realistic revenues from the disposal of the mines and minerals and it follows naturally, that any costs to a mining company which were the result of the provinces raising such revenue should be a cost in the spirit and intention of the Canadian Income Tax Act.

It is therefore submitted that regulation 701 should be repealed and that section 11 (1) (P) of the Income Tax Act should be amended to allow mining taxes, paid to a province, to be allowed in full, as an expense.

COMMITTEE NO. 3

Appendix "B"

RATES OF TAX OR ROYALTY BY PROVINCES

British Columbia	—	on the excess of $25,000	10%
Alberta	—	not applicable	
Saskatchewan	—	on the income derived from mining operations	12½%
Manitoba	—	on the excess of $10,000 1st year	6%
		2nd year	7%
		3rd year and thereafter	8%
Ontario	—	on the excess of $ 10,000 up to $1,000,000	6%
	—	on the excess of $1,000,000 up to $5,000,000	11%
	—	on the excess of $5,000,000	12%
Quebec	—	on the excess of $ 10,000 up to $ 1,000,000	4%
	—	on the excess of $1,000,000 up to $ 2,000,000	5%
	—	on the excess of $2,000,000 up to $ 3,000,000	6%
	—	on the excess of $3,000,000	7%
New Brunswick	—	on the excess of $ 10,000 up to $ 1,000,000	7%
	—	on the excess of $1,000,000 up to $ 5,000,000	8%
	—	on the excess of $5,000,000	9%
Nova Scotia	—	on the excess of $ 10,000 up to $ 1,000,000	3%
	—	on the excess of $1,000,000 up to $ 5,000,000	5%
	—	on the excess of $5,000,000 up to $ 10,000,000	6%
		add 1% for each $5,000,000 thereafter	
Newfoundland	—	on the income of an iron ore mine	20%
		but not more than 10 cents per ton on the first 1,500,000 tons of ore and not more than 8 cents per ton on each additional ton, on the income of all other mines	5%

COMMITTEE NO. 4

Chairman: Dr. J. P. Nowlan

COAL

Resolution No. 1

WHEREAS government subvention policy has been of great assistance to the Coal Industry over a considerable period of time and has aided the mines to improve their productivity and efficiency through additional mechanization and modernization.

AND WHEREAS such subvention policy has been heretofore on a year to year basis and has lacked assurance of the continuity necessary for long term planning and large scale investment;

AND WHEREAS the Honourable, The Minister of Mines and Technical Surveys on June 26th, 1963, gave notice in the House of Commons of the intention of the Government to introduce legislation at this session providing for long term subvention policy commencing with a firm commitment for a five year period beginning April 1, 1964.

THEREFORE BE IT RESOLVED that the Provincial Ministers of Mines here assembled be respectfully requested to transmit to the Government of Canada the thanks and appreciation of the Industry for the assistance rendered in the past and in the present instance; and further to request that this proposed legislation be proceeded with at the earliest possible date in this Session of Parliament.

DECISION OF THE MINISTERS

The resolution was adopted as read.

As timing is also a factor in presentation of this resolution, the Chairman of the Conference sent a copy of this resolution to Mr. Benidickson simultaneously with the resolution of Committee No. 3.

COMMITTEE NO. 5

Co-Chairmen: Mr. H. H. Somerville
Mr. P. J. Mulcahy

PETROLEUM AND NATURAL GAS

Your Committee held meetings on May 24th, 1963, and September 16th and 17th, and its sub-committees and working committee also met during the year.

The Model Gas Storage Act and the Model Oil and Gas Unitization Act, both of which were submitted by the Lands Sub-committee, were approved.

The Lands Sub-committee proposes during the ensuing year to undertake the following projects:

(a) Continuation of the study as to the ownership of casing in abandoned wells where the title to the surface and the title to the minerals are held by different persons.

(b) A study of mechanics lien legislation affecting oil and gas and pipe lines with a view to formulating recommendations as to aspects of the legislation where uniformity might be achieved.

(c) A study regarding registration of unit agreements under the various land registration statutes of the Provinces.

(d) A draft of a model surface lease for a well site and access roadway.

The Technical Sub-committee submitted a revision of the Model Rules Governing the Drilling and Production of Oil and Gas Wells, which was approved.

Also approved were the following reports of working committees of the Technical Sub-committee:

"Report of the Multiple Completions Working Committee on Tests for Segregation in Multizone Wells".

Report of the Reserves Working Committee on the achievement of uniformity in the Western Provinces in the calculation and publication of estimates of established gas reserves.

Report of the Statistical Working Committee with seven model forms for statistical reporting.

Report of the Working Committee on Markets for Natural Gas.

Approval was also given to the Final Report of the Working Committee on Uniform Nomenclature-Petroleum Products, but with a recommendation that the definition of natural gasoline in the Glossary of Terms be deleted and that the Glossary only be commended for use in conservation legislation and in statistical reporting.

The Technical Sub-committee proposes during the ensuing year to undertake the following:

(a) Continuation of the work of the Statistical Practices, Legal and Natural Gas Markets working committees.

(b) A study regarding the risk factor in compulsory pooling legislation.

(c) A study regarding the disposal of salt water associated with oil production into formations other than the producing horizon.

The study regarding Conservation in Relation to Economics will now be undertaken by a special committee of government and industry representatives, rather than by the Technical Sub-committee.

Your committee has reaffirmed its support of the 14.65 pressure base for natural gas measurement and recommends that the Mines Ministers continue to promote its adoption throughout Canada.

Your Committee also adopted the following recommendations which are respectfully submitted for approval:

1. That copies of The Model Gas Storage Act, The Model Oil and Gas Unitization Act, The Model Rules Governing the Drilling and Production of Oil and Gas Wells and technical reports be distributed to Government and industry representatives.

2. That the Petroleum and Natural Gas Committee be contined as a Standing Committee.

All of which is respectfully submitted.

DECISION OF THE MINISTERS

After considerable questioning as to the reasons for the Committee's support of the 14.65 pressure base for natural gas measurement, the report was adopted as presented.

COMMITTEE NO. 6

Chairman: Mr. Stuart Anderson
Vice-Chairman: Prof. Paul Riverin

EDUCATION

The reports of the several National and Provincial Mining Associations on their educational and public relations program as presented by the Committee Secretary were accepted. The summary is attached for the information of the Ministers.

The Committee decided that in view of the probability that the work of the Education Committee is likely to increase, a Vice-Chairman should be named to work with the Chairman on a continuing basis. Professor Paul Riverin of L'Ecole Polytechnique, Montreal was named to the post.

A brief asking for the financial assistance of the several Provinces in the preparation of a brochure designed to enlist students in the Mineral Sciences was read by Mr. Ralph Hindson on behalf of the Canadian Institute of Mining and Metallurgy. The brief had earlier been presented to a meeting of the Ministers.

Following discussion the Committee arrived at the following resolution and recommended to the Ministers as follows:

"That the sum of $12,000 be made available by the Provinces to the Canadian Institute of Mining and Metallurgy toward the cost and distribution of the brochure proposed in the brief of the C.I.M.M. to the Mines Ministers, of which a copy is attached.

It is further recommended that the Vice-Chairman of the Conference, Dr. J. P. Nowlan, arrange for the allocation of this cost to the various Provinces in accordance with the usual formula and that he advise each Minister of Mines accordingly.

It is further recommended that the Chairman and Vice-Chairman of the Educational Committee be empowered to consult with the General Committee on Education of the C.I.M.M. with respect to the final content and format of the brochure.

In view of the shortage of candidates in all the mining disciplines the Committee feels that this brochure should be designed to have the strongest possible appeal to potential students of the Mineral Sciences and to create for all students a more favorable image of the Mining Industry."

The Committee also recommends that the Mines Ministers adopt the following resolution for presentation to the Federal Government:

"That the Government of Canada increase substantially its grants to all Canadian Universities for research programs in the fields of mining and metallurgy."

It appeared to the Committee that the Federal Goverment is devoting a much larger proportion of its grants to Universities for other fields of Research of perhaps less overall importance to Canada than these, concerning which this recommendation is made.

Th, Committee makes these recommendations in view of the importance of the Mining Industry to Canada in the fields of employment, gross national product, export trade and balance of payments.

DECISION OF THE MINISTERS

The report was approved except as follows:—

The recommendations of Committee No. 6 in regard to the brief submitted by the C.I.M.M. were considered and the following action taken:—

Approval of the recommendation is held over until the C.I.M.M. Educational Committee has presented the content and proposed format of the brochure to the Educational Committee of the Mines Ministers Conference for consideration and recommendations.

COMMITTEE NO. 6

Appendix "A"

BRIEF TO THE PROVINCIAL MINES MINISTERS' CONFERENCE

HALIFAX, N. S.

September 15 - 18, 1963

PRESENTED BY R. D. HINDSON

for the General Committee on Education for the Mineral Industry,
Canadian Institute of Mining and Metallurgy

BRIEF TO PROVINCIAL MINES MINISTERS' CONFERENCE

On behalf of the General Committee on Education for the Mineral Industry of the Canadian Institute of Mining and Metallurgy, and of the C.I.M. itself, we would like to thank you for fitting us into your busy schedule to discuss a subject which urgently concerns us all. If we succeed in our purpose for being here today we shall have each other to thank in the years ahead for in this purpose lies the future of the Canadian mining and metallurgical industry.

Our purpose is PEOPLE, highly competent people in the form of scientists and engineers, willing and capable of working as scientists and engineers in the mineral industry. For only through intensive research and development and constant application of sound scientific and engineering principles in all areas of our industry can we hope to survive or flourish.

New ways of mining, beneficiating and processing ores; extracting and refining the metal; working, fabricating and using the metal products; are being discovered almost every day. Long established processes are either becoming obsolete over night or are simply too costly to operate in the face of technological advancements.

The scientific revolution that is taking place today, and the technological changes that it is beginning to make in the mineral industry are a challenge to us all — a challenge that we should welcome. The old ways of doing things are no longer good enough. Better and more efficient mining and metallurgical techniques must be found, for the scientific revolution which is now going on will have a greater impact on our economic and social life, in a much shorter time, than the great industrial revolution of the last century. It is also much more international in character.

Gentlemen, we must join this revolution with all the vigour and ingenuity that our industry has shown in the past. If we don't or if we don't succeed in our efforts, Canada will lose its place as one of the foremost mining countries of the world.

To do this, however, we need highly skilled scientists and engineers coming from the very best of our students, to enter the mineral industry as mining and metallurgical engineers to ensure that our technology will be second to none — that if there is a cheaper and better way to mine, beneficiate or extract the metal from its ore, we will find it. Technology is a product that can be bought and sold like any other product of our mines or metallurgical industries. The successful country of the future will be the one with the most technology to keep for its own use or to sell on the international market place.

We admit that within our industry and those associated with it, are many who are complacent or who feel quite comfortable about the present state of affairs. This is not surprising in view of our past successes; The old order is changing, however, and a new look is sweeping over our industry, a look that promises to the most sophisticated scientist and engineer, all the challenge, excitement, and glamour that rocketry or nuclear science seems to possess.

What is the problem? We cannot get the men we need to help us win this scientific revolution, to help us put our industry on a sound, scientific and engineering basis, so that our competitive position on the international scene will be assured. For some reason we no longer present to the gifted and capable student the proper image as a suitable and satisfying place to apply his scientific and engineering training. As the Honourable Robert Winters said in a recent speech to the Association of Professional Engineers, in Hamilton — "Why, for example, should a young man wish to spend most of his life as a mining engineer, a profession that the general public associates with pioneering in remote areas with picks and shovels, in darkness and danger, when he can have all the glamour and acclaim that rocketry or nuclear science possesses?"

In the same speech he also says — "The flow of students enrolling for undergraduate study in many courses of engineering seems almost to be drying up — — in the basic studies of such important fields as geology, mining and metallurgy the lack of students at the undergraduate level is quite disturbing."

Gentlemen, we must improve our "show window". We must do those things which are necessary to compete with rockets and nuclear sciences so that we too can attract the quality and quanity of graduate engineers that we need to run our business in this scientific age.

The C.I.M. General Committee on Education was recently reconstituted to study this problem. Already plans have been laid to do what we can to change this unfortunate situation. We realize that much education must be done to update the thinking of our industry and the educators who support us. This we are committed to do. Our reason for being here today is not so much to acquaint you with the problem, because we are certain you are already aware of it, but to impress upon you its seriousness, to gain your active support for our program and your concrete support for one phase of it.

In order to improve our image with the imaginative and intelligent student, and to properly portray the scientific and engineering opportunities in our industry, we have already begun to prepare a brochure on "Careers for the Scientist and Engineer in the Mineral Industry." In this brochure, which will be printed in French and English, we shall stress research and development and the need for the application of the fundamentals of science and engineering to our industry by showing what has already been accomplished and the opportunities and challenge that remain.

Our industry does not need to take a back seat to any other scientific or engineering pursuit. We are living in the age of metals; nothing can be accomplished without them and our future depends on them. Space travel would be impossible without the advances that have been made in recent years by the mining and metallurgical engineer in the availability and improvements in properties of these metals.

When one considers that almost 65 percent of the elements known to man are metals it is not hard to realize the importance of the mining and metallurgical engineer in our society. The U.S.S.R. realizes this and in 1958 graduated four thousand highly skilled metallurgical engineers as well as another four - to five thousand metallurgically trained technicians. In the same year Canada graduated fifty metallurgical engineers and the number of metallurgically-trained technicians could be counted on two hands.

The punch line, gentlemen, that I am sure you have been waiting for, is that we would like you to contribute $12,000. towards the cost and distribution of this brochure. The writing, printing and circulation of the brochure will be our responsibility, but your advice and assistance in this task will be welcomed and appreciated.

With our many members and connections in the mining and metallurgical industry and educational institutions across Canada, and with the assistance of our many branches, we are in an ideal position to see that this brochure on "Careers for the Scientist and Engineer in the Mineral Industry" is properly used and finds itself in those places where it will do the most good. Similarly you are in a position to advance its distribution to provincial educational institutions.

This brochure will complement and support other parts of our programme which includes, among other things, high school visitations, a new movie stressing the technological aspects of our industry particularly the opportunities for research and development and science fairs. We also plan to make effective use of the movie "The Nation Builders" to which the provincial departments of mines have already contributed.

We estimate that our entire programme will cost approximately $50,000. This does not, of course, include the time spent by our individual members who will be working on this programme across Canada which is given voluntarily by themselves and the companies they represent.

We hope for a favourable reply, gentlemen, to our request for your support and respectfully ask that it be given your early attention.

The General Committee on Education for the Mineral Industry —
Canadian Institute of Mining and Metallurgy.

September 4, 1963

COMMITTEE NO. 6

Appendix "B"

REPORT ON PUBLIC RELATIONS AND EDUCATIONAL ACTIVITIES BY MINING ASSOCIATIONS

(a) **Mineralogical Association of Canada**

Letter:

Objective to advance knowledge of mineralogical services. Program basically educational but directed primarily to professional people and university students.

Annual publications and annual meeting.

Enclosures

Copy of the Canadian Mineralogist.

Copy of General By-laws.

(b) **Canadian Metal Mining Association**

Brochures:

(1) "Some Information on Entrance Awards, Fees and Living Accommodation for Students in mineral industry courses at Canadian Institutions of Higher education."

(2) "List of Filmstrips."

(c) Mining Association of British Columbia

Letter:

No undertakings designed to foster publicity for industry.

No P. R. or Educational publications for distribution.

(d) British Columbia and Yukon Chamber of Mines

Letter:

Chamber serves as publicity, information and public relations bureau for the industry in the area.

Acts as a prospectors' organization, as a clearing house for problems of the industry, and as a contact between sellers and potential buyers of mining properties.

(d) British Columbia and Yukon Chamber of Mines — (continued)

Maintains a mineral exhibit and mining library open to the public. Estimate 20,000 visitors a year. Has conducted prospectors training classes each winter for 44 years in co-operation with Adult Education Department, Vancouver Night Schools, U.B.C. and Department of Mines. Registration about 190.

Chamber's facilities and staff of three answer enquiries and provide information, particularly to students. Distribute literature issued by B. C. Department of Mines and Canadian Metal Mining Association. Does not publish literature itself.

Periodically arranges exhibits of minerals at public exhibitions, conferences, etc. Supplies speakers on mining subjects — professional or technical men associated with the Chamber.

Chamber is supported by voluntary membership contributions from about 1000 mining and business people. Membership includes prospectors, geologists, engineers, mining companies, supply firms, etc.

Also receives grants from City of Vancouver, Department of Northern Affairs and National Resources, B. C. Department of Mines and Petroleum Resources. A non-profit organization.

Assisted in the organization of the Lapidary Rock and Mineral Society of B. C., which now has 20 affiliated clubs.

Contributes mining news and information to press and radio.

Excerpt from letter: (Thomas Elliot, Manager)

"It is our contention that the more people we can get interested in mining, the better it will be for the industry. We impress upon the public that each and every one of them has the right to search for new mineral deposits, and that they may make important discoveries.

In this connection it is important that our mining laws be devised so as to encourage the maximum number of people to take an interest in prospecting and mining development. In other words these laws should encourage the "small man" in mining. Mining legislation in some areas has become too stringent, destroying all individual initiative.

The public relations aspect of mining has been sadly neglected. Every effort should be made by this industry to acquaint the public with what is involved in developing the mineral resources of this country. Unfortunately, the majority of people, including many of our politicians, have very little idea as to what makes this industry function. This is the story we must tell and we can only do it by a far more concerted effort than has been displayed in the past. More funds and appropriate literature should be made available to organizations such as ours.

Please be assured that we will do everything in our power to assist you."

Enclosures:

1. Text of address by Thomas Elliot to Northwest Mining Association, Spokane, Washington, 30 November, 1962.
2. Manager's Report 50th annual meeting B. C. and Yukon Chamber of Mines—Jan. 9, 1962.
3. Pamphlets: B. C. and Yukon Chamber of Mines.
4. Prospectus, Prospectors Mining School.
5. List of Mining Exploration Companies.
6. Mines Employment Directory.
7. List of Mines, Oils and Quarries.

(e) Alberta and Northwest Chamber of Mines and Resources

Letter:

Most activities have public relations overtones.

Speaker at annual dinner meeting is prominent in the industry.

Northwest mining meeting held in February each year to further liaison between northerners and Edmonton residents. Technical sessions free to students.

Air tour to some section of the North in July each year attracts New York financiers, research people, executives and mining supply people.

Annual report is the principal publication (attached).

Small rock and mineral sets, maps and reports available to students, schools and others.

(f) Canadian Petroleum Association

Major information program is the one on forums.

In another for rural areas, representatives of industry discuss problems and exchange information with municipal councillors.

In 1963 planned to start program of information to public and high schools in Alberta. Distributing booklets on historical aspects of the industry in Alberta. School kits will also be distributed.

Enclosures:

1. Pictorial chart "Science in the Search for Oil."
2. "Drilling and Production."
3. "Exploring for Oil."
4. "Mineral Leasing and Surface Rights."
5. "Alberta Oil and Gas Picture."

(g) Mid-West Metal Mining Association

Letter:

No pre-determined program and no regular distribution of pamphlets or information. Each request handled separately. Attempt to arrange for speakers, film, etc. Refer some enquiries to University, Research Council, Government agency, etc.

(h) Quebec Asbestos Mining Association

Letter:

P. R. program adopted in 1950 to inform employees and public (especially in Quebec) of the importance to the provincial economy of the Asbestos mining industry. Program is carried out under the auspices of Editorial Associates Ltd., Montreal.

Has established Quebec Asbestos Information Centre in Montreal.

Publications:

"Le Producteur d'Amiante" for employees, also distributed to Press and T.V. in the province and to M.P.'s, church and community leaders. Brochure to schools, churches, tourists, etc.

Arrange press coverage for important events in the industry.

Regular releases to press on matters of interest to the industry.

Consultations with members of the Association on matter of P. R. policy.

Most individual companies have for distribution to schools and visitors sample kits of processed asbestos.

Annual total cost of program is about $70,000.

Enclosures:

1. "Facts about the Quebec Asbestos industry"—(French and English).
2. "The Strangest Mineral Ever Known" — (French & English).
3. Special edition of "Precambrian" on the asbestos industry.
4. "Production of Asbestos Fibre."
5. "Asbestos Producer" — (bilingual).

(i) The Mining Society of Nova Scotia

Letter:

Ensure that meetings, including technical papers, are covered by provincial press. "No funds to undertake a genuine publicity program."

(j) Quebec Metal Mining Association

Letter:

Matter be brought to attention of Board of Directors at meeting of November 27th, 1962. No further communication.

(k) Ontario Mining Association

Letter:

As of November 19, 1962 had distributed booklet "Mining Explained in Simple Terms" to 96 primary and 19 secondary schools, and 84 primary separate schools. Were contacting schools of the Metropolitan area. Individual copies sent on request. Supply is now exhausted.

Literature available from other sources sent on request as available.

CLOSING PLENARY SESSION

The Closing Plenary Session of the Conference was held on Wednesday morning at 11:00 a.m. under the Chairmanship of the Honourable Donald M. Smith, Minister of Mines for the Province of Nova Scotia.

Mr. Smith thanked the delegates for their attention during the Conference and then called on Dr. J. P. Nowlan, Deputy Minister of Mines, Province of Nova Scotia, to read the discussions of the reports of the various working committees. Mr. Smith then thanked Dr. Nowlan and advised that the resolutions will be presented in due course to the Federal Minister of Mines and Technical Surveys in Ottawa at a later date.

The Honourable A. R. Patrick, Minister of Mines and Minerals, Province of Alberta, announced that it gave him great pleasure to extend on behalf of the Province of Alberta an invitation to the Conference to spend its coming-of-age birthday, the Twenty-first Annual Conference, in Alberta, on September 6 - 9th, 1964, at the Banff Springs Hotel, Banff National Park.

Mr. Smith on behalf of the Conference accepted the invitation of the Honourable Mr. Patrick and then thanked the stenographic staff of the Department of Mines for their work during the Conference; also the various firms which contributed to the success of the Conference, and the staff of the hotel for their courtesy and good service.

On behalf of the Mining Associations, Mr. E. A. Perry thanked the Ministers of the various Provinces who extended invitations to them to attend the Conference.

On behalf of the Canadian Petrolum Association Mr. John H. Wents expressed thanks.

Mr. D. P. Douglass, Deputy Minister of Mines for the Province of Ontario moved that the meeting be adjourned.

Mr. Beattie seconded the motion.

BRIEF PRESENTED

TO

THE RIGHT HONOURABLE LESTER B. PEARSON

AND

THE HONOURABLE W. M. BENIDICKSON

WITH RESPECT TO

CERTAIN RECOMMENDATIONS

ARISING FROM

THE TWENTIETH ANNUAL CONFERENCE

OF THE

PROVINCIAL MINISTERS OF MINES

1963

INTRODUCTION

On behalf of the Provincial Ministers of Mines we wish to express our appreciation for the opportunity of meeting with you to present certain recommendations arising from the Twentieth Annual Conference of Provincial Ministers of Mines as held in Halifax, N. S., in September 1963.

We also wish to express our appreciation to Mr. Benidickson for personally presenting the Reply to the Brief submitted to the Government of Canada which outlined certain recommendations arising from the Nineteenth Annual Conference of 1962.

This Reply was discussed in the appropriate Committees set up by the Twentieth Conference to consider various aspects of the mineral industry in Canada. Committee recommendations for the attention of the Government of Canada as approved and adopted unanimously by the Provincial Mines Ministers are herewith brought to your attention.

Committee No. 1 — Mining Problems

No recommendations were made for the attention of the Government of Canada.

Committee No. 2 — Problems relating to Geology, Geophysics, and Prospecting.

No recommendations directed to the immediate attention of the Government of Canada were made.

Committee No. 3 — Royalties, Taxation, and Tariffs

The Provincial Ministers of Mines approved certain recommendations of this Committee to be brought to the attention of the Government of Canada.

1. The meetings of Provincial and Dominion Statisticians as initiated by the Government of Canada are endorsed and the Committee recommends that similar meetings be held every two years with a view to further eliminating duplication and unnecessary reporting by the mineral industry.

2. The Committee again recommends that the Provincial Ministers request the Government of Canada to repeal Section 701 under the Canadian Corporation Income Tax Act and amend Section 11 (1) (P) to provide that mining taxes and royalties paid to a Province be allowed in full as a deductible expense.

3. The Committee recommends that the assistance under the Emergency Gold Mines Assistance Act, which is due to terminate on December 31, 1963, be extended for at least 5 years on a basis that is at least as favourable to the gold mining industry as it is at the present time.

We wish to note that this last recommendation was presented by letter to the Honourable Minister of Mines and Technical Surveys prior to the end of September, 1963, as directed by the Conference.

Committee No. 4 — Coal

The following resolution was adopted and because of possible urgency as to the element of timing was also presented to the Honourable Minister of Mines and Technical Surveys simultaneously with the Emergency Gold Mines Assistance Act resolution.

WHEREAS government subvention policy has been of great assistance to the Coal industry over a considerable period of time and has aided the mines to improve their productivity and efficiency through additional mechanization and modernization;

AND WHEREAS such subvention policy has been heretofore on a year to year basis and has lacked assurance of the continuity necessary for long term planning and large scale investment;

AND WHEREAS the Honourable, The Minister of Mines and Technical Surveys, on June 26th, 1963, gave notice in the House of Commons of the intention of the government to intoduce legislation at this session providing for long term subvention policy commencing with a firm commitment for a five year period beginning April 1, 1964.

THEREFORE BE IT RESOLVED that the Provincial Ministers of Mines here assembled be respectfully requested to transmit to the Government of Canada the thanks and appreciation of the Industry for the assistance rendered in the past and in the present instance; and further to request that this proposed legislation be proceeded with at the earliest possible date in this session of parliament.

Committee No. 5 — Petroleum and Natural Gas

This Committee has thoroughly studied the usage of various pressure bases throughout North America and reports as follows:

"Your Committee has reaffirmed its support of the 14.65 pressure base for natural gas measurement and recommends that the Mines Ministers continue to promote its adoption throughout Canada."

Committee No. 6 — Education

The following resolution was adopted for presentation to the Government of Canada:

"That the Government of Canada increase substantially its grants to all Canadian Universities for research programs in the fields of mining and metallurgy.

It appeared to the Committee that the Federal Government is devoting a much larger proportion of its grants to Universities for other fields of Research of perhaps less overall importance to Canada than these, concerning which this recommendation is made.

The Committee makes these recommendations in view of the importance of the Mineral Industry to Canada in the fields of employment, gross national product, export trade and balance of payments."

All of which is respectfully submitted on behalf of the Provincial Ministers of Mines of Canada.

D. M. SMITH,

Twentieth Annual Conference of
the Provincial Ministers of Mines.

PROVINCIAL MINISTERS OF MINES

Twenty-first Annual Conference

PROCEEDINGS

Banff Springs Hotel — Banff, Alberta

SEPTEMBER, 6-9, 1964

PROCEEDINGS

Twenty-First Annual Conference

of the

Provincial Ministers of Mines

SEPTEMBER 6th TO 9th, 1964

BANFF SPRINGS HOTEL

Banff, Alberta

Chairman of the Conference

HONOURABLE A. RUSSELL PATRICK

Minister of Mines and Minerals

PROVINCE OF ALBERTA

Secretary

H. H. SOMERVILLE

Deputy Minister of Mines and Minerals

TABLE OF CONTENTS

DATES AND PLACES
of the
ANNUAL CONFERENCES
of the
PROVINCIAL MINISTERS OF MINES

CONFERENCE	DATE	PLACE
First	April 14 - 16, 1945	Quebec, P.Q.
Second	November 22 - 23, 1945	Toronto, Ontario
Third	September 23 - 27, 1946	Winnipeg, Manitoba
Fourth	September 3 - 5, 1947	Keltic Lodge, Nova Scotia
Fifth	September 2 - 4, 1948	Jasper, Alberta
Sixth	September 7 - 10, 1949	Fredericton, New Brunswick
Seventh	September 13 - 16, 1950	Victoria, British Columbia
Eighth	September 4 - 8, 1951	Saskatoon, Saskatchewan
Ninth	September 15 - 17, 1952	Quebec, P.Q.
Tenth	September 16 - 18, 1953	Niagara Falls, Ontario
Eleventh	September 20 - 22, 1954	Winnipeg, Manitoba
Twelfth	September 12 - 14, 1955	Keltic Lodge, Nova Scotia
Thirteenth	September 10 - 12, 1956	Lake Louise, Alberta
Fourteenth	September 4 - 6, 1957	Vancouver, British Columbia
Fifteenth	September 3 - 5, 1958	St. Andrews, New Brunswick
Sixteenth	September 14 - 16, 1959	Regina, Saskatchewan
Seventeenth	October 16 - 19, 1960	Quebec, P.Q.
Eighteenth	September 17 - 20, 1961	Toronto, Ontario
Nineteenth	September 16 - 18, 1962	Winnipeg, Manitoba
Twentieth	September 15 - 18, 1963	Halifax, Nova Scotia
Twenty-first	September 6 - 9, 1964	Banff, Alberta

PROVINCIAL MINISTERS OF MINES AND DEPUTY MINISTERS AT THE TIME OF THE TWENTY-FIRST ANNUAL CONFERENCE OF THE MINISTERS OF MINES

MINISTERS OF MINES

Honourable W. J. Keough	Minister of Mines, Agriculture and Resources, Newfoundland
Honourable Donald M. Smith	Minister of Mines, Nova Scotia
Honourable Leo F. Rossiter	Minister of Industry and Natural Resources, P.E.I.
Honourable H. Graham Crocker	Minister of Lands and Mines, New Brunswick
Honourable Rene Levesque	Minister of Natural Resources, Quebec
Honourable G. C. Wardrope	Minister of Mines, Ontario
Honourable Sterling R. Lyon, Q.C.	Minister of Mines and Natural Resources, Manitoba
Honourable Alexander C. Cameron	Minister of Mineral Resources, Saskatchewan
Honourable A. Russell Patrick	Minister of Mines and Minerals, Alberta
Honourable Donald L. Brothers	Minister of Mines and Petroleum Resources, British Columbia

DEPUTY MINISTERS

Mr. Frederick Gover	Newfoundland
Dr. J. P. Nowlan	Nova Scotia
Mr. P. A. Murnaghan	Prince Edward Island
Mr. K. B. Brown	New Brunswick
Dr. P.-E. Auger	Quebec
Mr. D. P. Douglass	Ontario
Mr. Stuart Anderson	Manitoba
Mr. J. T. Cawley	Saskatchewan
Mr. H. H. Somerville	Alberta
Mr. P. J. Mulcahy	British Columbia

CONFERENCE ORGANIZING COMMITTEE

CHAIRMAN

Honourable A. Russell Patrick

Minister

Secretary

H. H. Somerville

Deputy Minister

Co-ordinator

Robert A. Seaton

Transportation

Dale R. Jordan

Ladies' Committee

Mrs A. R. Patrick, Chairman

Mrs. H. H. Somerville
Mrs. J. W. Patrick
Mrs. J. A. Dutton
Mrs. R. A. Seaton

Secretariat

Miss E. M. Anderson
Mrs. R. P. Fortier
Miss N. J. Dickenson
Mrs. C. A. Anderson
Miss N. E. Gibbs
Mrs. N. Harrison

PROGRAM

SUNDAY, SEPTEMBER 6th

9:00 a.m.-9:00 p.m.—REGISTRATION

10:00 a.m.-12:00 noon—PETROLEUM AND NATURAL GAS
Conservation in Relation to Economics

2:00 p.m.-5:00 p.m.—PETROLEUM AND NATURAL GAS
Lands subcommittee
Technical subcommittee

8:00 p.m.-9:30 p.m.—MEETING OF THE PROVINCIAL MINING ASSOCIATIONS

9:00 p.m.-10:30 p.m.—TEA AND COFFEE
For delegates and ladies
Guests of The British American Oil Company Limited

MONDAY, SEPTEMBER 7th

9:00 a.m.-2:00 p.m.—REGISTRATION

9:00 a.m.-10:30 a.m.—MEETING OF MINISTERS AND DEPUTY MINISTERS

10:30 a.m.—OPENING PLENARY SESSION
Honourable A. Russell Patrick, *Chairman*
Address of Welcome

REPLY TO THE BRIEF SUBMITTED TO THE GOVERNMENT OF CANADA FOLLOWING THE 20th ANNUAL CONFERENCE
by Honourable W. M. Benidickson,
Minister of Mines and Technical Surveys

NEW CHALLENGES FOR OLD
by Mr. E. A. Galvin, President,
Independent Petroleum Association of Canada

COAL'S TOMORROW
by Dr. N. Berkowitz, Head, Coal Division,
Research Council of Alberta

2:00 p.m.-5:00 p.m.—COMMITTEE MEETINGS
No. 1—MINING OPERATIONS
No. 2—GEOLOGY, GEOPHYSICS AND PROSPECTING
No. 3—ROYALTIES, TAXATION AND TARIFFS
No. 4—COAL
No. 5—PETROLEUM AND NATURAL GAS
No. 6—EDUCATION

6:15 p.m.-7:00 p.m.—RECEPTION
For delegates and ladies
Guests of the Independent Petroleum Association of Canada

8:30 p.m.—MEETING OF MINISTERS AND DEPUTY MINISTERS

9:30 p.m.-11:30 p.m.—DANCING

TUESDAY, SEPTEMBER 8th

9:00 a.m.-12:00 noon

2:00 p.m.-4:00 p.m.—COMMITTEE MEETINGS

2:00 p.m.-4:00 p.m.—PETROLEUM AND NATURAL GAS

SUPPLY AND DEMAND OUTLOOK FOR THE INDUSTRY
Mr. M. J. Huffman, Manager, Western Region, Transportation and Supply Department,
Imperial Oil Limited

FILM ENTITLED 'PIPELINE PATROL'
Mr. V. L. Horte, Vice-President,
Trans-Canada Pipe Line Limited

3:00 p.m.-5:00 p.m.—MEETING OF MINISTERS AND DEPUTY MINISTERS

6:15 p.m.-7:00 p.m.—RECEPTION
For delegates and ladies
Guests of the Alberta Division, Canadian Petroleum Association

7:15 p.m.-9:15 p.m.—CONFERENCE DINNER
Delegates and Ladies will be guests at a dinner given by the Honourable A. Russell Patrick, Minister of Mines and Minerals of the Province of Alberta

GUEST SPEAKER
Honourable Ernest C. Manning,
Premier of Alberta

9:30 p.m.—MEETING OF MINISTERS AND DEPUTY MINISTERS

9:30 p.m.-11:30 p.m.—DANCING

WEDNESDAY, SEPTEMBER 9th

9:00 a.m.-10:30 a.m.—MEETING OF MINISTERS AND DEPUTY MINISTERS

10:30 a.m.—CLOSING PLENARY SESSION

LIST OF DELEGATES REGISTERED AT THE MINES MINISTERS' CONFERENCE

NEWFOUNDLAND

Gover, Mr. F.	Dept. of Mines, Agriculture and Resources
Macdonald, Mr. R. D.	Labrador Mining and Expl. Company Limited
Selleck, Mr. Dave	Iron Ore Company of Canada

NOVA SCOTIA

Smith, Hon. Donald M.	Dept. of Mines
Nowlan, Dr. J. P.	Dept. of Mines
Brown, Mr. Edward D.	National Gypsum (Canada) Ltd.
Goudge, Mr. Grant M.	Dept. of Mines
MacQuarrie, Mr. John R.	The Canadian Rock Salt Co. Ltd.
Murray, Mr. D.	Dept. of Mines
Wright, Mr. J. D.	Dept. of Mines

NEW BRUNSWICK

Crocker, Hon. H. Graham	Dept. of Lands and Mines
Clements, Mr. C. S.	Dept. of Lands and Mines
McCullough, Mr. Gordon	Heath Steele Mines Ltd.
Scott, Mr. C. E.	Miramichi Lumber Company Limited
Smith, Mr. John C.	Dept. of Lands and Mines
Tooke, Mr. Alex M.	Dufferin Mining Ltd.
Towers, Mr. John	Heath Steele Mines Ltd.
Vandenbroeck, Mr. Joseph P.	Dept. of Lands and Mines
Warren, Mr. R. W.	Dept. of Lands and Mines
Young, Mr. W. L.	Mount Pleasant Mines Limited

QUEBEC

Auger, Dr. Paul-E.	Dept. of Natural Resources
Bellemare, Mr. J.-Maurice	Dept. of Natural Resources
Berube, Mr. H. S.	Gaspe Copper Mines, Limited
Brissenden, Mr. William G.	Noranda Mines Ltd.
Cooke, Dr. Fred C.	Opemiska Copper Mines Quebec Ltd.
Cunningham, Mr. C. D.	Dominion Coal Company Limited
Despres, Mr. J. P.	Iron Ore Company of Canada
Fafard, Mr. Jacques	Dept. of Industry and Commerce
Farnsworth, Mr. D. A.	Dept. of Natural Resources
Filteau, Mr. Paul A.	Quebec Asbestos Mining Association
Grenier, Dr. P. E.	Dept. of Natural Resources
Jones, Dr. I. W.	Dept. of Natural Resources
Langlois, Mr. L. G.	Quebec Metal Minning Association
Riverin, Mr. Paul E.	St. Lawrence Columbium & Metals Corp.
Tetu, Mr. Jean	Dept. of Natural Resources

ONTARIO

Wardrope, Hon. G. C.	Dept. of Mines
Douglass, Mr. D. P.	Dept. of Mines
Beattie, Mr. John	Ontario Mining Association
Bixler, Mr. William R.	Canadian Essex Oil & Gas Company
Brittain, Mr. William D.	Dept. of Energy & Resources Management
Brown, Mr. L. Carson	Dept. of Mines
Crayston, Mr. Edmund G.	Ontario Mining Association
Edmonstone, Mr. Neil	Steep Rock Iron Mines Limited
Escoffery, Mr. Bruce	Trans-Canada Pipe Lines Limited
Foo, Mr. Edmund	Trans-Canada Pipe Lines Limited
Fraser, Mr. Horace J.	Falconbridge Nickel Mines Limited
Gaetz, Mr. T. M.	The International Nickel Company of Canada Ltd.
Giffen, Mr. James Albert	Giffen and Pensa
Glover, Mr. Willard	Canadian Delhi Oil Co.
Goranson, Mr. E. A.	New Jersey Zinc Expl. Co. (Canada) Limited
Hurst, Mr. M. E.	Dept. of Mines
Kostuik, Mr. John	Denison Mines Limited
Lee, Mr. John E.	The Consumers Gas Company
Mollison, Mr. Richard D.	Texas Gulf Sulphur Company
Newton, Mr. Arthur	Union Gas Co. of Canada Ltd.
O'Connor, Mr. L. G.	Gas & Petroleum Association of Ontario
Perry, Mr. Edmund A.	Hollinger Con. Gold Mines Ltd.
Rickaby, Mr. Harold C.	Dept. of Mines
Scott, Mr. Ralph V.	Dept. of Mines
Sharp, Mr. Dennis A.	Dept. of Energy & Resources Management
Smith, Mr. Robert L.	Dept. of Mines
Visser, Mr. N.	Dept. of Energy & Resources Management
Wansbrough, Mr. Victor C.	Canadian Metal Mining Association

MANITOBA

Lyon, Hon. Sterling R.	Dept. of Mines and Natural Resources
Anderson, Mr. Stuart	Dept. of Mines and Natural Resources
Clarke, Mr. John Wesley	Paradise Petroleums Ltd.
Davies, Dr. James F.	Dept. of Mines and Natural Resources
Duff, Mr. J. A.	Canadian National Railways
Gobert, Mr. M. J.	Dept. of Mines and Natural Resources
Junker, Mr. Robert H.	Dept. of Mines and Natural Resources
Richards, Mr. James S.	Dept. of Mines and Natural Resources
Roper, Mr. John S.	Mid-West Metal Mining Association
Scarth, Mr. Will B.	Pascar Oils Limited

SASKATCHEWAN

Cameron, Hon. Alexander C.	Dept. of Mineral Resources
Cawley, Mr. James T.	Dept. of Mineral Resources
Arnold, Mr. W. P.	Rio Algom, Mines Ltd.

Austin, Mr. M. E.	Sun Oil Company
Barker, Mr. R. Anthony	Southwest Potash Corporation
Brandt, Mr. D. R.	Trans Prairie Pipeline
Cheesman, Dr. R. L.	Dept. of Mineral Resources
Coons, Mr. R. M.	Dept. of Mineral Resources
Cull, Mr. Harry	Whitehall Canadian Oils Ltd.
Dahl, Mr. Roy	Dept. of Mineral Resources
Edmonds, Mr. Byron P.	Kalium Chemicals Limited
Erbarth, Mr. Walter	Wintershall Oil of Canada Ltd.
Fedosoff, Mr. J.	Domtar Chemicals Limited (Sifto Salt Division)
Funkhouser, Mr. Ernest M.	Pure Oil Company
Furlong, Mr. D. B.	Producers Pipeline Ltd.
Gallagher, Mr. Jack P.	Dome Petroleum Limited
Goos, Mr. E. J.	Saskatchewan Chamber of Mines
Green, Mr. William H.	Gibson Petroleum Co. Ltd.
Harvie, Mr. Donald S.	Canadian Fina Oil Limited
Holstead, Mr. John B.	Duval Corporation
Jack, Mr. Peter S.	Potash Company of America
Jukes, Mr. A. H.	Central Del Rio Oils Ltd.
Kondi, Mr. Andy G.	Plaza Oil & Gas Ltd.
Krantz, Mr. Gilbert	Sybouts Sodium Sulphate Co. Ltd.
Lake, Mr. Harold E.	Eldorado Mining & Refining Limited
Laidman, Mr. Wm. M.	Central-Del Rio Oils Limited
Lebel, Mr. J. L.	The California Standard Company
Lindberg, Mr. Robert	International Minerals and Chemicals Corporation
Lougheed, Mr. D. D.	Imperial Oil Limited
MacNicol, Mr. James M.	Canadian Petroleum Association
Miltner, Mr. Donald E.	South Saskatchewan Pipe Line Company
Mode, Mr. D. H.	Dept. of Mineral Resources
Moore, Mr. G. Neely	Cominco
Morrice, Mr. W. A.	Hudson Bay Mining and Smelting Co., Limited
Morris, Mr. W. Page	Duval Corporation
Olson, Mr. Robert	Alwinsal Potash of Canada Ltd.
Powell, Mr. Larry C.	Marathon Oil Company
Powell, Mr. L. W.	The British American Oil Company Limited
Schneider-Pass, Mr. Arno	Mines Progress Inc., Highland Mills, New York
Seibert, Mr. Kenneth	Sybouts Sodium Sulphate Co. Ltd.
Smith, Mr. Joe P.	United States Borax & Chem. Corp.
Tamaki, Mr. Thomas	Dept. of Mineral Resources
Taylor, Mr. John M.	Canadian Pacific Oil and Gas Company
Thomson, Mr. Crawford M.	Manitoba and Saskatchewan Coal Company (Ltd.)
Tyerman, Mr. David M.	Barrister & Solicitor
Westfall, Mr. Millard	Husky Oil Canada Ltd.
Yates, Mr. O. C.	The Lloydminster Gas Co. Ltd.
	Northern Utilities (Sask.) Ltd.

47

ALBERTA

Patrick, Hon. A. Russell	Dept. of Mines and Minerals
Somerville, Mr. H. H.	Dept. of Mines and Minerals
Abercrombie, Mr. Robin J.	Canadian Association of Oilwell Drilling Contractors
Agey, Mr. C. S.	Amerada Petroleums Ltd.
Badyk, Mr. J. S.	Canada-Cities Service Petroleum Corp.
Berkowitz, Dr. N.	Research Council of Alberta
Berry, Mr. A. L.	Dept. of Mines and Minerals
Blackstock, Mr. W. J.	Abcon Engineering Ltd.
Blair, Mr. S. R.	Alberta & Southern Gas Co. Ltd.
Blancett, Mr. K. S.	Canadian Kewanee Limited
Booth, Mr. H.	Pembina Pipe Line Ltd.
Bredin, Mr. E. M.	Socony Mobil Oil of Canada Ltd.
Brinker, Mr. W. F.	Canadian Kewanee Limited
Brown, Mr. J. D. B.	Dept. of Mines and Minerals
Brown, Mr. L. I.	The California Standard Company
Callaway, Mr. N. R.	Imperial Oil Limited
Clark, Mr. Alex	The Calgary & Edmonton Corp. Ltd.
Connor, Mr. E. J.	Union Oil Company of Canada, Limited
Craig, Mr. D. R.	Oil and Gas Conservation Board
Crozier, Mr. L. L.	Canadian Kewanee Limited
Doerr, Mr. C. F.	Alberta Coal Company
Doig, Mr. I. M.	Canadian Petroleum Association
Donnelly, Mr. C. W.	Marathon Oil Company
Dutton, Mr. J. A.	Dept. of Mines and Minerals
Ebbels, Mr. J. C.	Shell Canada Limited
Ewart, Mr. T. G.	Crow's Nest Pass Coal Co.
Farrar, Mr. W. E.	Union Oil Company of Canada Limited
Finland, Mr. G. H.	Alberta and Northwest Chamber of Mines
Fraser, Mr. S. A.	Alberta Coal Company
Frocklage, Mr. R. J.	Canadian Petroleum Association
Fuller, Mr. Kenneth W.	Oil and Gas Conservation Board
Gallagher, Mr. E. J.	The British American Oil Company Limited
Galvin, Mr. E. A.	Medallion Petroleums Limited
Govier, Dr. George	Oil and Gas Conservation Board
Harquail, Mr. F. J.	Coleman Collieries Ltd.
Horte, Mr. V. L.	Trans-Canada Pipe Lines Limited
Howells, Dr. W. C.	Texaco Canada Limited
Huffman, Mr. M. J.	Imperial Oil Limited
Humphries, Mr. R. G.	The Toronto Dominion Bank
Laidlaw, Mr. R. W. A.	Gibson Associated Oils Ltd.
Lee, Mr. C. S.	Western Decalta Petroleum Limited
Lewis, Mr. D. E.	Imperial Oil Limited
MacKenzie, Mr. W. D. C.	Imperial Oil Limited
Manyluk, Mr. Frank	Oil and Gas Conservation Board
Marks, Mr. J. N.	Canadian Petroleum Association
McCardell, Mr. S. T.	Texaco Exploration Company

Mitchell, Mr. D. E.	Great Plains Development Company of Canada Ltd.
Morrison, Mr. Gordon	Oil and Gas Conservation Board
O'Brien, Mr. Christian A. E.	Triad Oil Co. Ltd.
Panchysyn, Mr. E. J.	Alberta Coal Company
Patrick, Mr. J. W.	Dept. of Mines and Minerals
Proctor, Mr. John W.	Canadian Petroleum Association
Rawlins, Mr. J. C.	Peace River Oil Pipe Line Co. Ltd.
Redmond, Mr. J. F.	Shell Canada Limited
Riva, Mr. Walter	Canmore Mines Ltd.
Schmidt, Mr. P.	Dept. of Mines and Minerals
Seaton, Mr. R. A.	Dept. of Mines and Minerals
Sielaff, Mr. R. L.	Tenneco Oil & Minerals, Ltd.
Smith, Mr. David	Field Title Service
Stewart, Mr. S.	Richfield Oil Corporation
Stuart, Mr. G. C.	Hudson's Bay Oil and Gas Co. Ltd.
Stuart, Mr. W. D.	Canadian Petroleum Association
Swann, Mr. R. H.	Canadian Fina Oil Limited
Theriault, Mr. G. H.	The Atlantic Refining Company
Thorburn, Mr. John	Trans-Canada Pipe Lines Limited
Turner, Mr. R. C.	The British American Oil Company
Whittaker, Mr. W. C.	The Coal Operators' Association of Western Canada
Williams, Mr. C. D.	Tenneco Oil & Minerals Ltd.
Wilson, Mr. Wm.	Canmore Mines Ltd.

69

BRITISH COLUMBIA

Brothers, Hon. Donald L.	Dept. of Mines and Petroleum Resources
Mulcahy, Mr. Patrick J.	Dept. of Mines and Petroleum Resources
Bonar, Mr. Robert B.	Dept. of Mines and Petroleum Resources
Davenport, Mr. George H.	Bralorne Pioneer Mines Limited
Elliot, Mr. Thomas	B.C. & Yukon Chamber of Mines
Gadbois, Mr. R. N.	Shell Canada Limited
Gordon, Mr. Gerald	Canadian Exploration Limited
Gower, Dr. John A.	Kennco Exploration, (Western) Limited
Greenlee, Mr. Barnette B.	The Anaconda Company (Canada) Ltd.
Hedley, Dr. Mathew S.	Dept. of Mines and Petroleum Resources
Huestis, Mr. H. H.	Bethlehem Copper Corporation
Hurdle, Mr. Bruce	Consolidated Mining & Smelting Co.
Ingram, Mr. William L.	Dept. of Mines and Petroleum Resources
Jewitt, Mr. William G.	B.C. Mining Association
Lineham, Mr. John D.	Dept. of Mines and Petroleum Resources
MacDonald, Mr. O. G.	Cowichan Copper Co. Ltd.
McGillivray, Mr. G. Bertram	Canadian Petroleum Association
McIntosh, Mr. John S.	Sheep Creek Mines Ltd.
Meeker, Mr. John C.	Pan American Petroleum Corporation
Mitchell, Mr. Charles H.	The Mining Association of British Columbia
Morris, Mr. J. Royden	The Cariboo Gold Quartz Mining Co. Ltd.
Murray, Mr. R. C.	Amerada Petroleum Corporation

Peck, Mr. J. William	Dept. of Mines and Petroleum Resources
Postle, Mr. Lawrence T.	The Granby Mining Company Limited
Poyen, Mr. John S.	Imperial Oil Limited
Rasmussen, Mr. L. Merrill	Pacific Petroleums Ltd.
Richards, Mr. L. J.	Hudson's Bay Oil and Gas Company Limited
Sargent, Dr. Hartley	Dept. of Mines and Petroleum Resources
Springer, Mr. Karl J.	Mastodon-Highland Bell Mines Ltd.
Tough, Mr. W. J.	Falconbridge Nickel Mines Limited
Walker, Mr. Arnold M.	Texada Mines Ltd.
Wilson, Mr. Walter	Dept. of Industrial Development, Trade & Commerce
Wright, Mr. Harold M.	Western Mines Ltd. & Wright Engineers Ltd.

CANADA

Benidickson, Hon. Wm. M.	Dept. of Mines and Technical Surveys
Van Steenburgh, Dr. W. E.	Dept. of Mines and Technical Surveys
Brown, Mr. Alec	Dominion Coal Board
Buck, Mr. W. Keith	Dept. of Mines and Technical Surveys
Convey, Dr. J. C.	Dept. of Mines and Technical Surveys
Drolet, Mr. Jean-Paul	Dept. of Mines and Technical Surveys
Fortier, Dr. Y.	Dept. of Mines and Technical Surveys
Harrison, Dr. J. M.	Dept. of Mines and Technical Surveys
Hindson, Mr. Ralph D.	Dept. of Industry and Commerce
Hodgson, Mr. Ted	Dept. of Mines and Technical Surveys
Hopper, Mr. W. H.	National Energy Board
Hunt, Mr. A. D.	Dept. of Northern Affairs & National Resources
Hyslop, Mr. C. T. W.	Dept. of Northern Affairs & National Resources
Jordan, Mr. A. T.	Dept. of Northern Affairs & National Resources
Mackinnon, Mr. Vincent E.	Dominion Coal Board
MacLaren, Mr. Ian	Dominion Coal Board
McKinnon, Mr. Ian N.	National Energy Board
O'Brian, Mr. C. Lewis	Dominion Coal Board
Palmer, Mr. J. C.	Dept. of Northern Affairs & National Resources
Scotland, Mr. William A.	National Energy Board
Streeter, Mr. Percival	Dominion Coal Board
Thoms, Mr. B. H. J.	Dept. of Northern Affairs & National Resources
Toombs, Mr. Ralph B.	Dept. of Mines and Technical Surveys

LIST OF LADIES PRESENT

NEWFOUNDLAND

Macdonald, Mrs. R. D.

NOVA SCOTIA

Brown, Mrs. Edward D.
MacQuarrie, Mrs. John R.

NEW BRUNSWICK

Clements, Mrs. C. S.
Crocker, Mrs. H. Graham
McCullough, Mrs. Gordon
Tooke, Mrs. Alex M.
Towers, Mrs. John
Vandenbroeck, Mrs. Joseph P.

QUEBEC

Berube, Mrs. H. S.
Brissenden, Mrs. William G.
Fafard, Mrs. Jacques
Filteau, Mrs. Paul A.
Langlois, Mrs. L. G.

ONTARIO

Beattie, Mrs. John
Brittain, Mrs. William D.
Brown, Mrs. L. Carson
Edmonstone, Mrs. Neil
Escoffery, Mrs. Bruce
Foo, Mrs. Edmund
Giffen, Mrs. James Albert
Glover, Mrs. Willard
Kostuik, Mrs. John and
Mrs. John Kostuik, Jr.
Lee, Mrs. John E.
O'Connor, Mrs. L. G.
Perry, Mrs. Edmund A.
Rickaby, Mrs. Harold C.
Sharp, Mrs. Dennis A.
Wansbrough, Mrs. Victor C.

MANITOBA

Duff, Mrs. J. A.
Junker, Mrs. Robert H.
Roper, Mrs. John S.
Scarth, Mrs. Will B.

SASKATCHEWAN

Arnold, Mrs. W. P.
Austin, Mrs. M. E.
Barker, Mrs. R. Anthony
Cameron, Mrs. Alexander C.
Cawley, Mrs. James T.
Cull, Mrs. Harry
Edmonds, Mrs. Byron P.
Erbarth, Mrs. Walter
Fedosoff, Mrs. J.
Funkhouser, Mrs. Ernest M.
Furlong, Mrs. D. B.
Green, Mrs. William H.
Harvie, Mrs. Donald S.
Holstead, Mrs. John B.
Jukes, Mrs. A. H.
Kondi, Mrs. Andy G.
Lake, Mrs. Harold E.
Lebel, Mrs. J. L.
Lindberg, Mrs. Robert
Lougheed, Mrs. D. D.
MacNicol, Mrs. James M.
Miltner, Mrs. Donald E.
Moore, Mrs. G. Neely
Morrice, Mrs. W. A.
Morris, Mrs. W. Page
Olson, Mrs. Robert
Powell, Mrs. Larry C.
Powell, Mrs. L. W.
Taylor, Mrs. John M.

ALBERTA

Abercrombie, Mrs. Robin J.
Badyk, Mrs. J. S.
Berkowitz, Mrs. N.
Berry, Mrs. A. L.
Blair, Mrs. S. R.
Blancett, Mrs. K. S.
Booth, Mrs. H.
Brinker, Mrs. W. F.
Brown, Mrs. J. D. B.
Brown, Mrs. L. I. and Susan
Callaway, Mrs. N. R.
Craig, Mrs. D. R.
Crozier, Mrs. L. L.
Doerr, Mrs. C. F.
Dutton, Mrs. J. A.
Ebbels, Mrs. J. C.
Ewart, Mrs. T. G.
Finland, Mrs. G. H.
Fraser, Mrs. S. A.
Fuller, Mrs. Kenneth W.
Gallagher, Mrs. E. J.
Galvin, Mrs. E. A.
Govier, Mrs. George
Howells, Mrs. W. C.
Huffman, Mrs. M. J.
Humphries, Mrs. R. G.
Laidlaw, Mrs. R. W. A.
Lee, Mrs. C. S.
Lewis, Mrs. D. E.
MacKenzie, Mrs. W. D. C.
Marks, Mrs. J. N.
McCardell, Mrs. S. T.
Mitchell, Mrs. D. E.
Morrison, Mrs. Gordon
Panchysyn, Mrs. E. J.
Patrick, Mrs. A. Russell
Patrick, Mrs. J. W.
Proctor, Mrs. John W.
Rawlins, Mrs. J. C.
Redmond, Mrs. J. F.
Riva, Mrs. Walter
Schmidt, Mrs. P.
Seaton, Mrs. R. A.
Sielaff, Mrs. R. L.
Somerville, Mrs. H. H.
Stewart, Mrs. S.
Stuart, Mrs. G. C.
Swann, Mrs. R. H.
Theriault, Mrs. G. H.
Turner, Mrs. R. C.
Whittaker, Mrs. W. C.
Wilson, Mrs. Wm.

BRITISH COLUMBIA

Bonar, Mrs. Robert B.
Brothers, Mrs. Donald L.
Davenport, Mrs. George H.
Gadbois, Mrs. R. N.
Greenlee, Mrs. Barnette B.
Hedley, Mrs. Mathew S.
Huestis, Mrs. H. H.
Hurdle, Mrs. Bruce
Jewitt, Mrs. William G.
MacDonald, Mrs. O. G.
McGillivray, Mrs. G. Bertram
McIntosh, Mrs. John S.
Meeker, Mrs. John C.
Mitchell, Mrs. Charles H.
Morris, Mrs. J. Royden
Murray, Mrs. R. C.
Peck, Mrs. J. William
Poyen, Mrs. John S.
Rasmussen, Mrs. L. Merrill
Wright, Mrs. Harold M.

CANADA

Benidickson, Mrs. Wm. M.
Convey, Mrs. J. C.
Drolet, Mrs. Jean-Paul
Farman, Miss E.
Fortier, Mrs. Y.
Gould, Miss R.
Harrison, Mrs. J. M.
McKinnon, Mrs. Ian N.
O'Brian, Mrs. C. Lewis
Van Steenburgh, Mrs. W. E.

OPENING PLENARY SESSION

Chairman: Hon. A. Russell Patrick
Minister of Mines and Minerals
Province of Alberta

September 7, 1964, 10:30 a.m.

The meeting was addressed by the chairman as follows:

First, may I extend the heartiest greetings from the Government of the Province of Alberta to you all. We hope that those of you who have not been at Banff before will find its scenic beauty both exciting and comfortable. For those of you who have been here before, we trust your return will be accordingly well received.

Albertans are naturally proud of their Province, and of Banff. The hand of providence has been very kind to us both geographically as you can see around you in this beautiful spot, and geologically, with the riches that lie beneath the surface of our Province.

Our responsibility comes of course, in ensuring that the providential wealth we enjoy will be used in the most efficient and intelligent manner for the benefit of Alberta and the rest of Canada. This has always been of primary concern to the Government administration, and will continue to be a guide-line for any future policy we initiate.

At the present time the abundant resources which lie beneath the plains of Alberta are providing products to the Province, the country and in fact, the Continent. Alberta gas is flowing daily to the Southern United States. Crude oil is providing the base stock for refineries in Ontario and plastic and textiles whose origination is in the natural gas fields of Alberta are finding a market throughout the world. Sulphur production has placed Canada in the role of a major producer for that mineral.

This must have an impact not only on Alberta, but on Canada. The transition from raw product to saleable product has not always been easy. I do not have to remind those of you representing industry that you, your principals and organizations like you, have invested more that $4 billion in this Province, and that is a lot of money in any language. We in the Government have endeavoured to create an environment which will allow a maximum operational freedom for this massive capital investment, with a minimum of official interference. I believe we have worked well together.

Now to be specific, what has been the result of this great influx of investment capital on the resources which lie dormant for so many decades. Crude oil production for example, has risen from an average daily production of 17,485 barrels in 1947 to 460,860 barrels per day at the end of 1963. Raw gas production has increased in the same period from 134,252 Mcf in 1947 to 2,758,161 Mcf average daily production at the end of 1963. During the present year all indications are that these record production figures will be again surpassed. To carry the raw material further, there are throughout the Province 76 gas processing plants, producing condensate and pentanes plus in excess of 20 million barrels annually. In addition, these same plants had turned out 1,227,000 long tons of sulphur during 1963. These products are only a minor part of gas processing, since after removal, the gas can then be introduced into Alberta Gas Trunk Line gathering system for sale in Alberta and for export.

This spring, first approval was given for a commercial operation at Athabasca oil sands. The size of this deposit almost defies description. The closest I can come would be to say that in 1963 the entire proven reserves of crude oil in the world were 331 billion barrels. The

Athabasca oil sands are estimated to contain more than 400 billion barrels. With all these figures concerning the petroleum and natural gas industry, we must not lose sight of our other mineral resources; that brings to mind, coal. There is no point in pretending that the coal industry in Alberta is as good as it was twenty years ago, but then, neither am I. We are being less than realistic to say that the development of petroleum and natural gas resources in Albertta has not had a detrimental effect on the coal industry. The point is, what can we do about it. Through the Alberta Research Council, a constant study program is being carried out designed to find new uses for coal and with this attitude, it will, no doubt, be solved. However, advances in technology have seriously affected the production of coal and made many of the methods in use twenty years ago, impractical from an economic point of view.

This has not been confined to the coal industry, but affects other aspects of our economic development. We sometimes have a tendency to think that if there were more markets for coal, there would be much more requirement for labour pool to meet these markets. Unfortunately, this is not the case, for the coal miner is not so much a victim of a receding demand for his production than he is subject to a rapidly changing technology which renders the methods of twenty years ago obsolete. As an example, coal production has been increasing in Alberta during the past three or four years and in fact, during 1963, totalled 2,289,000 tons, as compared to 2,035,000 tons, the previous year. This is primarily coal produced for the generation of thermal electric power and is entirely produced by a strip mine method, so from a production point of view, the picture is faintly heartening, and may some day, be good.

I am sure of one thing, we in Alberta will endeavour to change the coal situation as is possible. I would finally like to say, that as a comparatively new Province in a comparatively new country, we do not have an opportunity to draw upon a colourful and long history and maybe that is just as well, because that leaves us more time to consider the future. It is this concept that guides our policies and will continue to influence our development.

REPLY
of

The Honourable Wm. M. Benidickson,
Minister of Mines and Technical Surveys

to the

Brief Submitted to the Government of Canada
following the 20th Annual Conference of the Provincial Ministers of Mines

To the Provincial Ministers of Mines:

When you presented your Brief to my colleagues and me in Ottawa on February 3 of this year, I made provisional comment on a number of items in the Brief. At that time you asked me, and I promised, to provide a more formal answer some weeks in advance of the 21st Annual Conference. However, before asking specific comment on individual items in the Brief, I would like to reiterate the more general comment which I made last year in Halifax. Your annual meetings and the Briefs which you present to me as federal minister of Mines and Technical Surveys appear to me to be a logical and practical means of directing attention to problems of the mineral industry, which exist or may arise between the provincial mines departments and my own department or other federal government departments. Furthermore, your annual meetings provide an essential forum for discussing problems of a provincial character as well as those of national character. In our varying capacities, we are individually and collectively concerned with the well-being of the Canadian mineral economy; fortunately, annual conferences of the Provincial Ministers of Mines provide us with excellent opportunities of assisting in the development of a progressively greater economic structure based on minerals.

The resolutions in your most recent Brief have, as always, received full and careful consideration from the various departments which are concerned. The views of these departments and, therefore, of the Government of Canada, are reflected in the following comments on specific items in your Brief.

1. **Royalties, Taxation and Tariffs**

(a) It is my understanding—as you also indicate—that the meetings of the provincial and dominion minerals statisticians have proved fruitful. This is an area in which my own department, as the largest single user of statistics, is deeply interested. For both national and international reasons, accurate, uniform and meaniful statistics are essential tools in the modern age in which we live. My officials work closely with the officials of the Dominion Bureau of Statistics in the improvement of mineral statistics. They are strong supporters of provincial efforts to eliminate duplication and unnecessary reporting and of provincial efforts to improve uniformity.

(b) The recommendation that Section 701 of the Income Tax Act be so modified as to provide that mining taxes and royalties paid to a provincial government be allowed in full as a deductible expense has again been reviewed, and I am able to say only that no action on this matter is contemplated at the present time.

(c) I am pleased to be able to report to you that direct action has been taken to implement your recommendation that assistance under The Emergency Gold Mining Assistance Act to be extended.

Legislation was passed in December 1963 extending application of the Act for a period of four years to the end of 1967. No change was made in the level of assistance provided to

marginal gold mines. One restriction was introduced by this legislation for the purpose of preventing the spread of the social problems, which the assistance provided under the Act is intended to ameliorate. The restriction simply renders ineligible for assistance new mines, commencing production after June 1965, which do not provide direct support to existing gold-mining communities.

New mines, commencing production after that date, must establish that at least half of the employees of the mine at any time reside in one of the gold-mining communities specified in the Act. The restriction does not apply to placer-mining operations, and, of course, does not affect gold mines now in operation whether they are receiving assistance or not.

The recommendation for continuance of the assistance program to gold mines, which you forwarded to me in your letter in September last year, has a significant influence in our decision to continue the program.

2. **Coal**

As I announced on June 26 of last year in the House of Commons, and referred to at Keltic Lodge and later at the Plenary Session of your 20th Annual Conference in Halifax, the Government will provide assurance of continuity of subvention assistance by authorizing the payment of the amount of assistance deemed necessary under the present subvention policy for a term of five years from April 1, 1964. During this five-year period, full and urgent consideration will be given to the longer term future of the Canadian coal industry and of the communities which are wholly or partly dependent upon the industry.

3. **Petroleum and Natural Gas**

Your reaffirmation of support of the 14.65 pressure base for a natural gas development, together with the recommendation that the Mines Ministers continue to promote its adoption throughout Canada, has been noted. It is to be hoped that this matter will eventually be resolved to the satisfaction of all concerned.

4. **Education**

In respect to grants to Canadian Universities for research programs in the fields of mining and metallurgy, you will be pleased to learn that my Department has budgeted the record sum of $50,000 for the present fiscal year 1964-65. This is a five-fold increase over the $10,000 granted in 1962-63, the first year we were able to set aside an amount of money for this important purpose. These grants for research programs in the fields of mining and metallurgy are, of course, in addition to grants totalling $100,000 in 1964-65, awarded by the Geological Survey of Canada to stimulate and support geological research.

As you undoubtedly know, I am concerned about the future supply of trained professional minerals people, particularly in the mining and metallurgical fields, and I have taken every opportunity to publicize this concern during the past year. Our industry, now with an annual value of about $3 billion, must prepare itself for strong technological and economic competition in the years immediately ahead. We need an increased supply of bright, highly-trained engineers. May I express the hope that you, who hold responsibility for the well-being of the mineral industry in your own province, will do all possible to increase the flow of bright students into the minerals professions.

I consider it a privilege to have this opportunity to convey to Provincial Mines Ministers the federal government's views on the matters dealt with in the Brief arising out of your 20th Annual Conference. Although it is understandable that views may occasionally differ, it is implicit that we always give careful and sympathetic consideration to each other's problems. As I mentioned earlier, we are individually and collectvely concerned with the well-being of the Cana-

dian mineral economy and it is in this attitude that we approach mineral problems, be they regional or national in character.

One of my greatest gratifications, as federal Minister of Mines and Technical Surveys, is the pleasant relations which exist between all Ministers of Mines, as exemplified by the good will always evident at annual conferences of the Provincial Ministers of Mines.

Respectfully submitted,
Wm. M. Benidickson,
Minister of Mines and Technical Surveys

Mr. H. H. Somerville thanked Mr. Benidickson and introduced Mr. E. A. Galvin, President, Independent Petroleum Association of Canada, who addressed the meeting as follows:

Mr. Chairman may I at the outset express my appreciation to you and your Program Chairman for the opportunity of addressing a session of the Twenty-first Mines Ministers Conference. As you know this privilege was given to me as the President of the Independent Petroleum Association of Canada, consequently, I have the task of endeavouring to express what might be described as the collective view of our membership on those matters in which this Conference and our industry share some common interest.

I know that it is customary to say something complimentary about your host or the sponsoring organization of a conference such as this. Believe me, Mr. Chairman, this custom comes as no hardship to me as a member of the petroleum industry. First because government officials represent a very necessary liaison with all facets of resource development in Canada and, secondly, for providing a forum such as this for discussions on those matters which encompass the broad relationship between government and industry. For these reasons—coupled with your generous hospitality—I was more than happy to accept the invitation to address this session.

In selecting the title of "New Challenges for Old" I thought I would recall something of the history of IPAC and endeavour to describe how with the ever-changing nature of our circumstance, we independents are constantly faced with new problems which to a varying degree affect our corporate welfare. The vicissitudes of any business enterprise are such that competition will from time to time produce some pretty large swings in a company's profit and loss statement. In the producing petroleum industry we of course face the same problem, but it is magnified by nature of the high risk and the substantial capital investment that is required, a fact which constantly reminds us of the tight-rope upon which we must walk.

It is in such a light that I present these remarks to you this morning not that the independent industry is seeking your sympathy—but rather your understanding—for in every submission that we submit to a government body, it is encumbant upon us to impress on our legislators the magnitude of the risk which is so peculiar to our business.

Our Association came into being as a result of necessity and in our fourth year of operation we have 126 member companies and associates who by definition are not controlled by internationally owned or integrated oil companies. Following the report of the Borden Royal Commission, it was apparent that government regulation was to have a greater influence on petroleum development, and the managements of a number of the independent companies were concerned that future statutes and regulations might be drafted without distinguishing the impact or consequence that would be felt by the independent producer as compared with his big brother —the major integrated oil company. Prior to the formation of IPAC, submissions on industry problems were presented to governments and their agencies by those individual companies who

were most affected, however, quite often the opinion of the independent company was neither submitted or solicited and therefore was misunderstood through default. In order to give expression to this opinion, the Independent Petroleum Association of Canada was formed.

It would I am certain be repetitious to outline the many examples where our Association have become involved in discussion with governments on industry problems. Suffice it to say that we believe we have justified our existence to our members and at the same time received a courteous hearing and consideration from the various individuals and boards that we have appeared before. In the past our submissions dealt with questions of policy, amendments to tax legislation and suggestions on various forms of regulatory control. As an example, we were among the first to come before the Federal Government with proposals for a national oil policy, and we believe that our recommendations with regard to depletion allowance assisted the Federal Cabinet in their decision to alter this statute, which in turn provided some measure of relief to the entire petroleum industry. It would be wrong to say that in these submissions we accomplished all our objectives, and while some of these problems are yet unresolved, we have nevertheless made progress.

Well, so much for the past—and what are the new challenges facing us. Taxation, the development of the tar sands, new markets, prices, new discoveries, and imports might well rate on the list of the independent producers, but even ahead of these are two matters which may influence the broad fundamental policies on oil and natural gas legislation in Canada. They are both old chestnuts returning to trouble us again and I speak of the export of natural gas and the proration of oil in Alberta. I suppose that to some extent both of these questions may have a somewhat regional ring to them, and as I realize that I am privileged to speak to an audience national in its make-up, let me assure you that an adverse decision on either matter could well have a damaging impact on Canada's number one mineral resource with accompanying side effects to the entire Canadian economy.

You will no doubt recall that the Alberta Oil and Gas Conservation Board has only recently completed hearings on two applications to export an additional 4.73 trillion cubic feet of surplus natural gas from that Province. The battle lines were quickly drawn by the local gas utility companies and certain cities and muncipalities on the one side and gas and oil producers on the other. The argument essentially centred on whether or not the estimated reserves and the discovery rate were such as to warrant the granting of the applications.

When the Alberta Government initially established its policy governing the exportable surplus of natural gas, they introduced a provision which required that a thirty-year supply must be maintained before any gas was to leave the Province. Although it was a somewhat higher requirement than that enforced in other comparable gas producing areas, it was nevertheless generally agreed that it was a reasonable measure and would provide assurance for Alberta's domestic and industrial consumers that their demands would be given a protected priority. To the producer—it gave him that necessary encouragement to sell his proven reserves over and above the thirty-year limitation for without this encouragement the incentive to find and develop new resources would be non-existent. Coupled with this requirement of the Board has also been their policy to take into consideration future discoveries when estimating future gas reserves. This, too, was accepted as a logical and fair attitude, for in estimating either future growth or demand, the equation must relate one factor to the other. And so it has, since the introduction of the formula.

The case for the dissenters asking for rejection of the export applications was based on two principal arguments. The first being that the industry's forecast of future reserves and the

rate of discovery had been exaggerated and, secondly, that their estimates for domestic and industrial consumption were not protected by the thirty-year limitation.

It is not my purpose to restate the industry's rebuttal or to argue the statistical evidence which we believe, satisfied beyond all reasonable doubt, that Albertans were being given absolute protection for their own domestic requirements. But having said that let me make it abundantly clear of the consequences which inevitably must follow should any board or government seek to place unnecessary or over-cautious restrictions on the ability of the producer to market his gas. At the beginning of these remarks, I emphasized the risk factor involved in the search for oil or natural gas and I can tell you from some personal experience that dry holes or marginal wells can deplete the cash position of a small independent company with devastating effect. The chances of drilling unsuccessful wells are an unfortunate but inevitable part of our business. Should you tip the balance of this scale even further by denying the producer the ability to market his product, I have no hesitation in saying that the mortality rate of the independent producer will increase immeasurably. When you consider that the principal role of the independent producer has been that of undertaking the majority of wildcat drilling over the past decade, it naturally falls that without his participation in exploration the discovery rate will be substantially reduced.

As I have said before, we do not question either the necessity or the desirability of the thirty-year provision. As producers we are confident that the Province's domestic requirements have been adequately protected and that it was illustrated that present known reserves are at least in balance, if not in excess, of the thirty-year limitation. Beyond this we believe that it is not just short-sighted, but indeed irresponsible, to argue that any producer should be obliged by regulation not to sell his surplus product so long as a market either domestic or foreign still exists. Advocates of such an argument should perhaps be reminded that in this day of scientific achievement a source of energy may very quickly become obsolete and be replaced by a more sophisticated form. Indeed, the day may not be far off when other forms of energy will provide all our requirements and, like coal, our natural gas will then remain in place and unrequired. The significance of the Board's decision I suggest is important not just to the producers in Alberta or the export market, but also to each of your respective Provinces. Alberta provides some 90 per cent of the natural gas supply to all Canadian consumers and it should be remembered that of the two applications now under study, one of them (Trans-Canada Pipe Line Ltd.) hopes to considerably reinforce and expand its Canadian sales. A rejection of the Trans-Canada application would indeed have its impact on the entire Canadian economy.

It is perhaps timely that I should have the opportunity to speak to that segment of Government administrators when we of the petroleum industry have become so conscious and dependent on your advice to our political leaders. I say that because we, as independent producers of oil, are faced with a second major problem resulting from a change of Government policy. I refer, of course, to the Alberta Oil and Gas Conservation Board's recent decision to alter its system to prorating crude oil production to market demand. The new ground rules call for three main revisions involving, first, a severe slash in minimum producing rates, together with a conversion of the economic allowance to a floor allowance. Second, the introduction of a reserve basis for field allowables instead of the long accepted producibility factor, and third, well allowables based on acreage.

Our Association has voiced both our disappointment and concern over the Alberta Board's recommendation as they apply to the basic economic allowance. Our objection stems from the fact that most independents cannot compete with major oil companies in the discovery and

development of high reserve properties because of the large amount of capital involved. Our sources of income are obtained through yearly cash income from our operations or from capital financing and bank borrowing, consequently, we are limited in our ability to compete financially with the major corporate giants of our industry. It is therefore understandable that many independent companies have a large share of their properties in low reserve areas, and the proposed change in the system of prorating these pools will seriously discriminate against these independent producers who operate in a geographic segment of our petroliferous areas. We believe that the Alberta Board's proposals represent a reversal of its philosophy as stated in 1957 when it advocated an Economic Allowance System as a fair and equitable distribution of the productive capacity of the Province in terms of market demand. While the Board argues that this alteration in policy will reduce the production cost per barrel of oil, we maintain that in fact it will serve only to discourage the independent, in that his economic stability has in the past been calculated on totally different ground rules. The result will be unquestionably reduce the earning power of the majority of small companies, and therefore make it more difficult to raise their needed capital investment. The alternative for the small independent is indeed not a pleasant one. He may seek other areas in his search for oil and gas where government regulation does not discourage his incentive. He will have difficulty surviving in a climate where the rules of the game are changed while the game is still being played. Finally he will have to decide whether the new regulation has turned his moderately profitable operation into a marginal or deficit position and it is our contention that it will only be a matter of time before another group of independents has been removed from the Canadian oil scene. Their loss Mr. Chairman can provide little satisfaction to any one, for the record will show that the independent companies today operate some 65 per cent of the exploratory wells in Alberta and their new difficulties can only bring about a lessening in competition for potential oil properties in this Province. In the final analysis all Canadians become the losers. Without a healthy and aggressive group of independents, those of you who still harbour some hope of uncovering petroleum wealth in your respective Provinces, will find it difficult to persuade any but the more venturesome to undertake your exploration program. This indeed has been the history of oil and gas search throughout Canada. It is therefore both my responsibility and my obligation to register in the strongest possible language our concern over any action that will jeopardize that segment of the petroleum industry which has in the past contributed so much to the Canadian economy.

Up until now, my remarks have essentially dealt with our problems and you might well ask what can the independent oil companies do for this—what contribution can they yet make to a new and more prosperous society. As indivual companies or as a collective entity, given the opportunity, we will continue to provide Canada with most of its exploratory drilling, generate the largest volume of investment capital and with a little good luck, together with sound management, it will be our drilling bits that will discover the majority of oil and gas pools.

Such a forecast may indeed appear optimistic in the light of what I have previously said, and for the moment must be conjecture. By the very nature of our independence, we must be optimistic. We ask that you as Government representatives allow us to get on with the job. For our part, we can make this promise without conjecture that the oil patch, no matter where it is located, will through our active participation continue to be the most competitive hunting ground in the long history of resource development, if we are permitted to find, develop and market our oil and gas reserves.

Mr. Chairman I close these remarks as I began, by underlining what might be described as the fundamental cause of our problem. It is my belief that our government and industry representatives meet all too seldom for the purpose of exchanging opinions. From our industry's

standpoint and, in particular, that segment which I represent here today, we must accept our full share of this responsibility—but I can tell you as a consequence of the events of the past few weeks we have indeed learned an object lesson. While we for our part accept our obligation to communicate with you, we respectfully ask of you that you provide us with that opportunity of consultation in reviewing each problem before a policy has been either recommended or formulated. We ask nothing more, believing as we do that each of us under such understanding can better perform our responsibility.

New Challenges for Old—yes we have many of them—and while the problems of yesterday tested the ingenuity and talents of government and industry alike, to those who survived them we believe that the new challenges, though they appear both awesome and difficult, will be met by the same determination in search of a solution. Toward such an objective each of us must dedicate ourselves so that together we can look back and say that we played some small part in a chapter of Canada's industrial growth.

Mr. Somerville thanked Mr. Galvin and introduced Dr. N. Berkowitz, Research Council of Alberta, who addressed the meeting as follows:

A recent Edmonton Journal article reporting the current $35 million expansion of Calgary Power's thermal generating station at Wabamun, some 40 miles west of Edmonton, noted with apparent surprise that "the change from gas to coal isn't coming about because of a mistake; it was planned that way".

In the light of Western Canadian developments in the late 1940's and throughout the 1950's, the element of surprise is understandable—even though what is now happening was anticipated and, in fact, repeatedly spelled out in various economic forecasts. In the wake of the great oil and gas discoveries, it was not unnatural that one should think of coal as "obsolete". But those who did so seemed all too often to forget that "obsolescence" in the fuel and power domain is rarely more than a matter of costs; and they were evidently also quite unfamiliar with the potential versatility of coal.

This is not to suggest that the Canadian coal industry, or at least its Western component, is now "out of the woods". Its struggle for bare survival will almost certainly have to continue for some years yet, and it is more than likely that the industry will also have to face considerable reorganization and reorientation before it can regain economic health and its former importance in the society. However, that it will eventually do so—or that coal **per se** will do so—seems to me indisputable.

I cannot better contain the reasons for this view in a short statement than my saying that coal is, in a sense, somewhat like a Picasso painting: in both, one can see what one wishes to see . . . except, perhaps, that modern technology (and current economic trends) give coal a distinct practical edge over the Picasso!

In what follows, I shall try to briefly examine the future place of coal in Canada. In the main, I shall deal with Western Canadian coal; and at the risk of seeming parochial, I shall take most of my examples from Alberta (which I happen to know best). Something of what I have to say, however, also hold some relevance for the Maritimes which face particularly serious and intractable problems.

COAL AS A PRIMARY FUEL

Because coal is still mainly seen as a primary fuel, it is customary to judge the "health" of a coal industry in terms of tonnage output. One can legitimately contend—and I submit that one ought to do so—that this view of coal is quite needlessly restrictive and that output in itself will often mean little (even if it is relatively high). A ton of coal products sold at, say $1,000 will, in any terms, always be more significant than 500 tons of coal sold at $1 per ton. However, even in the conventional context, in which coal is no more than a primary fuel, current developments have forced important reassessments.

In large measure, the gradual re-entry of coal into the industrial scene is a direct consequence of increasing maturity of the Canadian gas industry. As a result of developing demand for natural gas in centres far removed from the supply sources, well-head prices of gas have doubled (and sometimes more than doubled) during the past decade; and this, coupled with increasing efficiency of coal production (which now permits strip mining at costs as low as 7 cents/million b.t.u.), is once again establishing coal as the preferred fuel for thermal power stations. The expansion (and/or conversion) programs now under way at Wabamun and at Canadian Utilities' Battle River plant, and Edmonton's planned development of a municipally-owned generating station at Genessee, are all cases in point. When fully operative, these three installations alone will consume between 4.5 and 5 million tons of coal per year.

Within Alberta, a continuance of this trend to coal-firing in thermal generating plant will eventually depend upon the availability of cheap **underground** coal. There are convincing indications that massive reserves of strip coal may be confined to presently exploited locations (and to the Sheerness area where, however, lack of adequate water supplies presents obstacles to power development). But prairie underground coal, now being produced for a diminishing domestic market at ca. 25 cents/million b.t.u., could, if mined for an assured large market, be won at around 14-15 cents/million b.t.u. And assuming no dislocating importation of power from, say, the B.C. Peace River power project or large blocks of "byproduct" hydro power from new flood control dams within reasonable distance of main demand centres, underground mines would therefore be expected to play an increasingly important role in future power generation.

Development of cheap underground coal (in some instances perhaps by such radical departures from established practices as hydraulic mining) may very well also be hastened by the course of events elsewhere. Coal-based power is already making more or less important contributions in Saskatchewan, Manitoba and Ontario (as well, of course, as in the Maritime provinces); and in the first three, it could make even greater ones. But economic transportation creates a serious barrier to expansion. Saskatoon's Queen Elizabeth station could only remain on coal because a recent, very drastic downward revision of freight rates on coal movement permitted shipments from east-central Alberta. In Manitoba, however, expansion of coal-fired generating capacity encounters almost insuperable difficulties. And the Ontario coal demand has to be met by imports from Pennsylvania and W. Virginia—although recent changes in the Federal government's subvention policy now allows some movement of Maritime coal into this market.

In these circumstances, very considerable importance attaches to efforts to develop alternative, more economic forms of transportation. I refer, in particular, to current Canadian research into new concepts of solids pipelining (which seems to hold particular promise for long-distance movement) and to the development of so-called unitized or integral trains (which seem to offer a means of cheap bulk commodity conveyance over distances up to, say 400-500 miles). Preliminary estimates indicate that these methods could easily halve present transportation costs, and that pipeline movement of coal could, under certain, seemingly not impractical conditions, permit

delivery of Western Canadian coal in Toronto at prices which are fully competitive with those now commanded by imported coal.

How soon and to what extent such innovations in transportation can be implemented remains, of course, open to question. But in the light of projected Canadian power demands and fuel costs it can, I think, be taken for granted that several areas now beyond economic reach of Canadian coal will not long remain so.

I would, in this connection, like to draw your attention to the fact that we are beginning to witness a marked trend towards rather large, centralized stations, and that such stations provide a strong stimulus to the development of new (specialized) forms of fuel transportation. If this trend continues—and in the light of current preoccupation with the feasibility of extensive regional power grids, this is very probable—we could see a far more massive development of coal than one would now care to predict.

It is also entirely likely that some of these developments will have important repercussions on steam-raising in medium and heavy industry, in which fuel expenditures are generally substantial enough to make even small savings per million b.t.u. add up to significant totals. In other words, cheap coal mined primarily for power station use and cheaply moved to such stations would be available to, and undoubtedly used by, other consumers. There are perhaps already indications of such a trend—if not yet in actual reconversion then in tacit plans for reconversion. A notable example is the cement industry. How extensively this will develop must, however, depend on factors over which potential industrial coal users have little control. If, through penetration of the Central Canadian power market, indigenous coal can enter the heavily industrialized regions of the country, additional steam coal production in both East and West is a foregone conclusion. But if the Ontario stations remain closed to Canadian coal producers, it is equally certain that coal consumption for industrial steam-raising will, at least in the foreseeable future, remain exceedingly limited.

Notwithstanding other developments, it also seems to me quite unlikely that coal can make any real inroads into home—and institutional heating. So long as the national economy remains reasonably buoyant, home owners will continue to demand the undoubted conveniences which contemporary fully automatic gas—or oil-fired heating appliances offer; and they will be quite prepared to pay the price which these conveniences entail. Theoretically, coal could recapture a part of this market through continued development of small "packaged boilers" which, **prima facie**, offer many of the same advantages. But unless we were to witness extensive adoption of district heating schemes, this appears to be a somewhat improbable happening.

COAL AS A SECONDARY FUEL

I now turn to another important area of coal utilization—the manufacture of reductants, i.e., cokes and chars, for the metallurgical industry.

Technically, a sharp distinction must be made: **cokes** can, in practice, only be produced from special coal types which, in this country, occur in limited (though substantial) quantities in the Maritimes and in the Rocky Mountains, while **chars** can be obtained from almost any coal, including the subbituminous coals of central Alberta and lignites of Saskatchewan. And this technical dichotomy seems to me to entail a definite dichotomy in the respective development of the two kinds of resources.

On balance, it is virtually certain that the more difficult — although in some respects more interesting—future must be faced by the coking coals, even though these are globally and within N. America, in limited supply and hence, **a priori**, more valuable. The problem arises,

in essence, from the fact that the scarcity of high-quality coking coals elsewhere has prompted technical developments which, over the years, have progressively and drastically lessened industrial dependence on metallurgical coke. So far as I know, only blast furnaces and cupolas nowadays still demand such coke; almost all other operations can accept "substitutes".

From this, two conclusions derive. First, within Canada, the demand for indigenus coking coal will depend on the size of the indigenous iron and steel industry and, more important, on the availability of cheap transportation. Whether Maritime and/or Western coking coals can avail themselves of the 4-5 million tons/year market for such coal in Ontario will, in other words, be determined by whether steam coal can reach Ontario. If no entry can be effected there, indigenous markets for coking coal will remain small—although it could still be lucrative if such coal were to be used for the production of structural carbons (cf. below). Second, much will depend on whether—again through economic transportation—it is possible to develop and hold export markets.

Some relief for Western producers of metallurgical coal is now afforded by a subvention policy which permits limited shipments of coking coal (ca. 700,000 tons/year) from the Crowsnest Pass region to Japan. But there is bound to be concern over the prospects of long-term continuance of this assistance, and hence over the permanence of the Japanese market. Barring disastrous economic recessions, Japan herself represents both a stable and a very large market —and certainly a much larger market than current shipment figures indicate: the quantities of Canadian coal now moved there are limited, not by demand for coal, but by limitations placed on spendable subvention monies. However, until the need for subvention is eliminated, it seems unlikely that Western producers can significantly increase their foothold here.

So far as Western producers are concerned, then, major hopes must centre on possibilities for more economic mining and more economic transportation. And this is, of course, fully realized by them.

I am inclined to think that what best illustrates the potential of Western coking coal is the increasing frequency with which encouraging straws in the wind now appear. For example, the gradual expansion of the steel industry on the U.S. Pacific coast has prompted American steel interests to examine movement of metallurgical coal from Alberta. There is growing (and active) interest in the possibility of pipelining coal from NW Alberta to tidewater. And an initial experiment by Coleman Collieries Ltd. with a form of hydraulic mining—which could lead to greatly reduced mining costs—seems to have been sufficiently successful to encourage further work along this line.

In these circumstances, predictions would be foolhardy. Any one of the several potential schemes for exploiting Western coking coal could, at almost any time, become practical and bring about a major change in the present situation. The central fact, which we would do well to bear in mind, is after all that foothills metallurgical coal is the only such coal in North America west of the Appalachians—and therefore, if for no other reason, bound to come into its own sooner or later. In a sense, I suppose, Western coking coal resources represent something of a parallel to Alberta's Athabasca Oil Sands.

I would, however, make one additional comment. From time to time, statements appear about the possibility of basing a power station development on foothills coal. This is, I think, an exceedingly unlikely possibility—and was so even before the Columbia River treaty was ratified. In planning for the future of foothills coal, we might usefully discount it.

With respect to coal chars, a rather different situation appears to be developing. For various technical reasons, the manufacture of chars does not require the heavy capital outlays

for plant which coke production entails; and it is also possible to operate on a much smaller scale. As a result, Canadian producers are beginning to find it possible to take advantage of a variety of indigenous developments and to enter several markets now existing or emerging in the NW United States. One cannot, perhaps, here expect very rapid, or individually very spectacular, new ventures. Carbonization industries and their customers are for the greater part still in a transition stage whose final outcome is virtually impossible to assess. Three recent Western developments, however, ought not go unnoticed. The first is the successful producing and marketing of barbecue briquettes from Saskatchewan lignite by Dominion Briquettes & Chemicals Ltd., which reportedly has a 40,000-50,000 t/yr capacity. The second is the production of formed furnace coke at Canmore Mines Ltd., which began a year or two ago with an output of ca. 100 t/hr and is now said to require the erection of a second unit of similar size. And the third, and newest, is the installation of a rotary carbonizer at Lethbridge Collieries Ltd. which, commencing late this year, will produce some 40,000 t/yr of char for metallurgical operations at Kimberley, B.C. What is particularly significant about these developments is that they represent new ventures for markets which were not, until now, open to Canadian suppliers.

COAL AS A NON-FUEL SOURCE MATERIAL

When considering the prospects for conventional (fuel) utilization of coal, one deals with a more or less familiar domain in which developments are, as a rule, clearly determined by economics: whether or not a given industrial installation uses coal will, first and foremost, depend on the cost of coal vis-a-vis alternative fuels available to it. In such a situation, research has little room for manoeuvre: the most useful research program would quite evidently be that which holds most promise of opening volume-markets—and in the Canada of 1964, this must, I believe, necessarily centre on transportation.

But in considering new—so-called "unconventional"—uses for coal, one contemplates a radically different situation. One now considers uses which depend, for the greater part, on imaginative research and development—and on the willingness of established industries to revise their thinking and to move along essentially untried paths.

For the wholly "practical man", the concept of coal as a non-fuel source material—as, say, a structural material or an intermediate in chemical manufacturing—must therefore raise a series of questions to which it is sometimes not even possible to give tentative answers. And yet, from several laboratories there are now emerging ideas and processes which, one feels, could make a very profound impact on coal as well as on coal industries.

Some of these "new uses" of coal are, of course neither new nor, when placed in a Canadian context, particularly relevant. I refer especially to coal hydrogenation and coal gasification, i.e. to two sets of processes which attract so much attention because they seem capable of consuming large tonnages of coal; that they are designed to produce synthetic liquid and gaseous fuels and/or chemicals seems sometimes almost to be thought coincidental. What can usefully be said about these processes has already been said many times, and I would therefore here only note that while both remain amenable to important technical improvements which could conceivably place them in a rather different light, neither is as it stands of much practical interest at this time. And bearing in mind the magnitude of Canada's chemical markets and her reserves of oil and gas, they are not likely to command much attention in the foreseeable future—though I would hope that this will not deter Canadian scientists from devoting some efforts to them.

On the other hand, very real significance—at least for those interested in Canadian industrial diversification and in using readily available indigenous resources for this purpose—lies, in

my view, in several emergent possibilities for using coal as a parent material in the production of a range of "specialty products". It is only fair to say that few if any of such possibilities are ready for immediate commercialization, and that most do, in fact, still require considerable research and/or pilot plant development. But what is so important about them—and what, I submit, amply justifies the efforts that must be made if they are to be translated into reality—is (i) that most of them have already moved out of the (sometimes nebulous) "conceptual" stage; (ii) that none would, if ultimately found to be practical, require a greater scale of operation than Canadian markets could readily sustain; (iii) that none would demand inordinately high (or even high) capital investments; and (iv) that several of them would produce commodities which, because of their intrinsic value, could accept fairly heavy transportation charges.

A partial list of these possibilities—a few of which have recently been reviewed in some detail*—includes

(i) the manufacture of **activated carbons** and **filtration media** from subbituminous and bituminous coals—now in the process of being tested on a pilot-plan scale and in consumer trials;

(ii) the production of **high-purity carbons** and **synthetic graphites** (i.e., mineral matter-free carbons) from various subbituminous coals by such reactions as sulphomethylation — currently being studied in the laboratory but approaching pilot-plant operation;

(iii) the production of a wide range of **structural carbons** (e.g. Corrosion-resistant tubes, plates, heat exchangers, pumps, tower packings, catalyst supports, etc.) from coking coals—already commercialized in Great Britain but not yet seriously studied in N. America;

(iv) the possible manufacture of sustained-nitrogen-release **fertilizers** from subbituminous coals and lignites—presently being explored in the laboratory and in growth chamber—and field plot-tests, and approaching the pilot-plant stage; and

(v) the possible production of such diversified commodities as **flame retardants**, **synthetic tanning agents**, **drilling mud additives** and **pesticides**—also all being explored in the laboratory and rapidly reaching a pilot plant stage.

These possibilities—and a number of others not yet so far advanced towards practical evaluation—ought to command serious attention and support. I concede that some of them are alien notions, not ordinarily associated with coal utilization. But I suggest that they would, if found to have practical merit, be valuable additions to the Canadian industrial scene; that they would allow commercialization in precisely those regions which contain coal resources but which are more or less far removed from major traditional coal markets; and, above all, that they illustrate what might be done with coal, i.e. that they illustrate something of the potential and the future of coal.

COMMENTS

Because I am convinced that future utilization of coal in Canada will in large measure depend on the formulation (and proving out) of strange—and sometimes perhaps even outrageous—ideas, and because the eventual impact of such developments on coal production must be entirely speculative, I have refrained from advancing estimates of such production. So far as the Canadian West is concerned, I could only say that I would expect eventual coal output to substantially exceed the production figures of the mid-1940s—when the coal industry was generally considered to be a very healthy and important one. I would, however, by way of a summary, make three observations.

*RCA Contrib. No. 246: "Coal as a Non-Fuel Source Material: the Present Status", presented before the 1964 Annual Meeting of the Engineering Institute of Canada; Eng. J., in press.

First: in the general area of heating and steam-raising we can, I feel certain, look to continued expansion of coal-fired thermal stations near our coal deposits, and we can—though not, perhaps, in the relatively near future—also expect that Canadian coal will capture a large share of the Central Canada coal market through advances in transportation techniques. For various reasons, one would expect this to make a greater impact on Western than on Maritime coal production. Industrial steam-raising by coal can be expected to follow current trends in power generation only if advances in transportation permit entry of indigenous coal into Ontario markets, but will otherwise remain relatively small (especially in Western Canada). Domestic and institutional heating is unlikely to create a growing demand for coal.

Secondly: production of coking coal could be very substantially boosted if such coal could enter Ontario; but in the foreseeable future, it is more likely to be determined by export markets. Such markets exist. The extent to which they can be reach will, however, depend upon whether producers can achieve significant further reductions in mining costs and/or in the costs entailed in moving coal to tidewater. Growing demands for chars and so-called industrial cokes (i.e. cokes not suited for iron and steel production but acceptable in other metallurgical operations) could offer indigenous coking coal some new outlets, but producers will here be faced by effective competition from prairie subbituminous coal and non-coking bituminous coal. In the Maritimes, increasing consumption of bituminous coking and non-coking coal may also be expected in new thermal power stations.

And third: the rapidly growing interest in non-fuel utilization of coal can be expected to result in several practical developments in the foreseeable future. In the Canadian West, major coal producers have already moved some way towards such developments, and it is quite likely that some commercial ventures, initially centreing on the production of carbons, will commence within the next year or two. In the Maritimes, corresponding developments may be somewhat slower—although a successful venture in Western Canada could conceivably accelerate moves into quite a number of hitherto unexplored directions. Much will, of course, depend on the outcome of current (and projected) research programs in which the coal industry and associated interests are now beginning to participate; and I would therefore hope that such research (which is for the greater part sponsored by Provincial and Federal Governments) will continue to receive adequate support. At the present time, **ideas** for useful coal research are still being generated at a faster rate than can be actively explored, and we are, in fact, nowhere near having exhausted the potential of coal.

COMMITTEE REPORTS, RECOMMENDATIONS

AND

DECISIONS OF THE MINISTERS

COMMITTEE NO. 1

PROBLEMS RELATING TO MINING OPERATIONS

Co-Chairmen: Mr. F. Gover
Mr. D. P. Douglass

1. (a) **Non-destructive testing of mine hoisting ropes and equipment.**
Recommended to carry over to 1965.

(b) **Salt corrosion in mine hoisting ropes and guides.**
30

2. **Use of ammonium nitrate as an underground blasting agent.**
Recommended to carry over to 1965.

3. **On-site storage of ammonium nitrate-fuel oil mixtures.**
Recommended to the Ottawa Explosives Division to look at O.I.C. No. 335-1957 to allow storage of ammonium nitrate—fuel oil mixtures—mixed on site for a compartively short time.

4. **Report of subcommittee on silicosis and medical examination of miners.**
30

5. **Hoisting safety devices for intermediate obstructions in mine shafts.**
30

6. **Standardization of explosive and blasting agent magazines.**
Recommended to carry over to 1965.

7. **Effects of noise on mine workers' health.**
Carry over to 1965.

8. **The pollution of streams and lakes by mine waters.**
It is recommended that the Federal Department of Mines and Technical Surveys carry out research in conjunction with the Federal Department of Fisheries on this problem.

9. **The responsibility of the Crown for hazards left by abandoned mining operations.**
30

Other business:

A committee to be set up of the Chief Inspectors of Mines to study the reclamation of mining lands.

Suggested Canada-wide mine rescue competition for Canada's centennial year 1967 to be studied by a committee of Chief Inspectors of Mines, to report back in 1965.

DECISION OF THE MINISTERS

Report and recommendations approved by the Ministers.

COMMITTEE NO. 2

PROBLEMS RELATING TO GEOLOGY, GEOPHYSICS AND PROSPECTING

Chairman: P.-E. Auger
Secretary: H. Sargent

1. **Report of subcommittee on preservation of exploration data.**

Following the resolution by Committee No. 2 at the 1963 conference, a subcommittee was formed to study a proposal that a form be prepared for voluntary completion by industry recording the type of exploratory work done on properties or in areas.

As secretary of the subcommittee, Dr. Cheesman reported that a form has been devised and has been tested by submission to industry, and that the response so far has been mainly favourable.

It is recommended that the subcommittee continue its efforts, and that the provincial authorities encourage those in industry to complete and return the forms.

It is also recommended that the subcommittee report on this matter at the 1965 conference.

2. **Review of variation in presentation of data, geological maps and the need for further standardization.**

It is felt that geological data and maps published by the provincial and by the federal governments should be standardized in the symbols used.

The Geological Survey of Canada published some years ago a booklet of such geological symbols that has been used widely.

It is recommended that the Survey revise this booklet and publish it after consulting with the provinces.

3. **Problems of adequately staffing Provincial Geological Branches.**

Discussion of possible incentives, salaries, work program and academic requirements.

It is becoming increasingly difficult to hire and to keep the personnel required for provincial geological branches. In order to attract and to retain in service, adequately trained and experienced personnel, incentives such as higher salaries and some form of field bonus, or leave of absence with pay during the summer is necessary.

This problem is particularly acute where field work is done in areas remote from civilization.

It is significant that the problem is less acute in The Federal Geological Survey, where salaries are higher and working conditions and facilities for research are better.

The opinion was expressed strongly by industry that both salaries and working conditions must be improved in order to solve the problem.

The committee recommends that The Provincial Ministers of Mines, realizing that The Provincial Departments have difficulty in recruiting and retaining qualified and experienced personnel, take steps to adjust salaries and working conditions wherever possible.

4. **Discussion of Provincial-Federal surveys in respect of standardization of type of reports, scale of maps, etc.**

The problem of concern is the current publication by Nato countries of topographic maps at scales that are ratios such as 1:250,000 and 1:500,000, whereas in Canada geological maps are published at scales such as 1 inch to 4 miles and 1 inch to 1 mile.

The Federal Government is considering overprinting a grid on topographic maps, and this may have a bearing on the problem.

The committee feels that no action should be recommended until that study has been completed.

5. **Reports accepted for assessment credit, re Geological, Geochemical and Geophysical Work.**

(a) Availability for study in Mines Dept. offices, and amount of use made.

(b) Practice in respect of photo-copying or otherwise making copies available.

Each province is accepting reports for assessment work according to slightly different standards; the main difference being in the length of time that such reports are kept confidential.

The Committee considers that it is of great importance to industry that there shall be good facilities for studying and for obtaining copies of the reports once they are off confidential status; and that the situation should be reviewed at the next meeting of The Conference.

6. **Data on exploration costs and personnel employed.**

(a) Adequacy of coverage on personnel directly employed and costs involved.

(b) Adequacy of similar data for work done by contract.

The adequacy of data obtained in response to forms sent out by the provinces and the Dominion Bureau of Statistics was discussed.

It was suggested that concentration in one part of the form of the questions on personnel employed and expenditure made on exploration, would contribute to a better response by industry; and a subcommittee was appointed to review the current forms and discuss the matter with the Chairman of Committee No. 3.

Further Business

The importance to those concerned with exploration of prompt processing of applications to record mineral claims and of preparation of maps showing the claims recorded, was stressed.

It was reported that when staking booms occur there may be delays in recording claims and producing maps.

It was recommended that the Ministers bring to the attention of the Provinces the importance of providing funds to permit hiring personnel to perform this essential work promptly.

It is recommended that Committee No. 2 be continued at the 1965 Conference.

DECISION OF THE MINISTERS

Item No. 3 was discussed and noted. Balance of the report and recommendations approved by the Ministers.

COMMITTEE NO. 3

ROYALTIES, TAXATION AND TARIFFS

Chairman: Mr. P. J. Mulcahy

1. **Review on Mineral Statistics Reporting.**

The series of forms now used by the Dominion Bureau of Statistics and the Provinces for Annual Census of the Mineral Industry are designed primarily to cover the Mineral Production phase of the industry and pay scant attention to the very important Exploration and Development phases. Further, much of the form now used is not applicable to exploration and development operations and consequently many exploration organizations are not completing the forms.

It is considered that the well-being of the Mineral Industry requires that authoritative statements can be made regarding the expenditure on Exploration and Development and the numbers employed, which data are currently far from complete.

It is recommended—

1. that the Ministers be asked to support the proposal that the forms be revised so as to be used more readily by organizations engaged mainly in exploration.

2. that the Ministers authorize the formation of a working committee representing the Provincial Mines Departments and the Mineral Industry to devise a suitable form in preparation for the March, 1965 meeting of Provincial and Federal Statisticians.

2. **Comments on Short Digest and Mining Tax Base.**

It is respectfully requested that the Provincial Ministers of Mines again draw to the attention of the Federal Tax authorities the unsatisfactory and inequitable operation of Section 701 of the Income Tax Regulations; that they express their regret that no solution has been found and, after due consideration, reaffirm their original request that Section 701 be eliminated.

3. **Discussion of the mines and minerals acquired and held by Canada in each of the Provinces.**

Having regard to mineral resources within provinces providing part of the tax base for provincial revenues, and

Having regard to the cumulative effect of the federal government acquiring mineral rights and thus removing a part of the provincial tax base,

It is recommended that a subcommittee be appointed from the Mines Departments of Ontario, Manitoba, Saskatchewan and Alberta to compile an inventory of mineral acreage acquired by Canada through federal legislation.

DECISION OF THE MINISTERS

Report and recommendations approved by the Ministers as to items 1 and 3. With respect to item 2, the Ministers decided to reaffirm last year's resolution to the Federal Government.

COMMITTEE No. 4

COAL

Chairman: Dr. J. P. Nowlan

It was agreed that the following resolution be presented to the Ministers of Mines for transmittal to the Government of Canada.

Resolution

Whereas the representations by the Provincial Ministers of Mines to the Government of Canada in the matter of assistance to the Coal Industry and in the continuity of subventions have received favourable consideration, and:

Whereas coal constitutes a major portion of Canada's energy reserve and the continuation of the present policies in these matters is of vital importance to the Canadian producers:

Therefore be it resolved that the Provincial Ministers of Mines here assembled be respectfully requested to transmit to the Government of Canada the continued thanks and appreciation for the full measure of assistance given to the Canadian Coal Industry over the

years, including the valuable services of the Dominion Coal Board, and to express the sincere hope that this sympathetic consideration will continue to be extended in the future.

DECISION OF THE MINISTERS

The resolution was adopted by the Ministers.

COMMITTEE No. 5

PETROLEUM AND NATURAL GAS

Co-Chairmen: Mr. H. H. Somerville
Mr. J. T. Cawley

Your committee held meetings on September 7th and 8th and its working committees met on occasions during the year.

The Land Subcommittee has undertaken the preparation of a Model Oil and Gas Well Casing and Tubing Property Act and also a model form of surface lease for wellsites and it is expected that these models will be concluded during the coming year. In addition model Regulations for Exploration for Gas Storage will be considered.

During the coming year the Technical Subcommittee and its working committees will undertake

(a) Establishment of casing salvage rules

(b) Continue efforts towards standardization of statistical information for computor application.

Your committee has considered the definition of a barrel of oil and for purposes of uniformity recommends the adoption of 34.9723 Canadian gallons at 60° Fahrenheit as the definition for a barrel.

Consideration was also given to the standardization of definitions for well classification and it was unanimously decided that the Lahee System of well classification be adopted for use in provincial publications. This system has been universally used by the American Association of Petroleum Geologists.

It was explained to the committee by Dr. Y. Fortier, Director of Geological Survey of Canada, that the National Advisory Committee on Research in the Geological Sciences has formed a subcommittee to study a national system of geological data recording; that is a study of the various needs and the various ways to meet these needs in an endeavour to achieve a common system of geological data recording.

Your committee will invite the National Advisory Committee to present a report on the progress of its study at our meeting to be held at the next Conference.

The continuation of the committee as a standing committee is also recommended.

DECISION OF THE MINISTERS

The report was adopted.

COMMITTEE No. 6

EDUCATION

Chairman: Mr. Stuart Anderson

Technological advances are discovering new deposits from one end of Canada to another. New production and refining techniques are permitting utilization of lower grade deposits. These developments are creating a critical demand for skilled men. There is now, in Canada, a serious shortage of all skills in the mining industry, ranging from professional engineers and scientists to technicians and tradesmen.

The Canadian Institute of Mining and Metallurgy has launched a vigorous campaign to acquaint the youth of Canada with the challenging opportunities in the mineral industry. This winter, all branches of the C.I.M. will be holding meetings with both teachers and students in high schools and universities to arouse their interest in our industry. We earnestly recommend your support in this recruiting drive and recommend that you bring it to the attention of your respective Ministers of Education.

Resolution No. 1

The Committee recommends to the Ministers that an unconditional grant of $15,000.00 be made to the General Committee on Education of the Canadian Institute of Mining and Metallurgy for the production of an attractive general brochure on careers in the mineral industry and for the preparation of a folder of educational literature for use by Institute branches in provincial high schools and universities.

Ministers will recall the brief submitted to them last year in Halifax, requesting financial assistance in the preparation of the general career brochures. This year the General Committee on Education C. I. M. submitted a supplementary brief to the Committee describing the progress it had made in the preparation of the general career brochure and other career literature during the past year. A comprehensive program of distribution and personal contact with students across Canada was also described.

It was the unanimous feeling of Committee No. 6 that the General Committee on Education C.I.M. warrants the financial support of the Provincial Ministers of Mines in this project. Since the new careers brochure, in both French and English, is almost ready to go to press, and since the organization for its effective and personal distribution is now being established, the C.I.M. Committee's need for this financial assistance appears to be urgent.

Resolution No. 2

The Committee recommends to the Ministers that the Provincial Ministers of Mines through their Chairman convey their appreciation to the Canadian Institute of Mining and Metallurgy for the excellent work its General Committee on Education has done during the past year in attacking the serious problems of mineral industry education in Canada.

Resolution No. 3

The Committee also recommends to Ministers that the Canadian Institute of Mining and Metallurgy, through its General Committee on Education, be asked to study, in collaboration with such industry associations as may be appropriate and desirable, the lack of incentives

for young people to embark on professional careers in the mineral industry. The seriousness of this matter was the subject of a special paper by the Vice-Chairman of Committee No. 6, copies of which are attached, and it was followed by considerable discussion on possible methods of study and solution. The action now recommended to Ministers is considered to be the most logical and best approach as it involves those most intimately concerned, i.e., the profession and the industry.

DECISION OF THE MINISTERS

The report was adopted by the Ministers and the Secretary was directed to assess each of the Provinces for its share of the grant mentioned in Resolution No. 1.

BRIEF TO THE PROVINCIAL MINES MINISTERS' CONFERENCE

Banff, Alberta
September 7-9, 1964

from

THE GENERAL COMMITTEE ON EDUCATION
CANADIAN INSTITUTE OF MINING & METALLURGY

COMMITTEE MEMBERS

Mr. R. D. Hindson	Chairman	Dept. of Industry, Ottawa
Prof. Paul E. Riverin	Vice-Chairman	Ecole Polytechnique
Mr. W. Keith Buck	Secretary	Dept. of Mines & Tech. Surveys
Mr. E. G. Tapp	Treasurer	Canadian Institute of Mining & Metallurgy
Prof. A. V. Corlett	Past Chairman	Queens University
Dr. I. R. Bradfield		Noranda Mines Ltd.
Prof. G. M. Brownell		University of Manitoba
Dr. R. D. Parker		International Nickel Co. of Can.
Mr. W. S. Row		Kerr Addison Gold Mines Ltd.
Prof. F. A. Foreward		Privy Council Office
Dr. H. H. Yates		McGill University
Mr. R. E. Barrett		Canadian Institute of Mining & Metallurgy
Prof. H. R. Rice		University of Toronto
Mr. M. A. Upham		International Minerals & Chemicals Corp.
Dr. W. F. James		Buffam & James

BRIEF TO PROVINCIAL MINES MINISTERS' CONFERENCE

First of all the C.I.M. General Committee on Education would like to thank you for the privilege and the opportunity of coming before you again to ask your support for a project which is as important to you as it is to us, for on the success of this project depends to a large extent the future of the Canadian mining, metallurgical and petroleum industry.

At your meeting in Halifax, a year ago, we presented a brief requesting financial assistance in order to help us help you and the industry you represent. This brief still stands and the only thing we would change in it is the amount of assistance required. If you would like this brief re-read to you now I would be happy to do so.

At that time we requested $12,000.00 towards the cost and distribution of a brochure on Careers in the Mineral Industry. We now find that to do the job properly this will not be enough and that an additional $3,000.00 will be required to support the program we now have underway. We hope you can see your way clear to support us for this larger amount and that you will make the $15,000.00 available to us as soon as possible.

Since we met together in Halifax a year ago, the C.I.M. General Committee on Education has not been idle. The display table that you have all seen will indicate this.

Time does not permit me to outline to you all of our activities so I will confine myself to the new Career Brochure for which we are asking your assistance.

This brochure is almost complete and will be ready to go to press within the next few weeks. You will, I know, be pleased with it. Publication of a brochure, however, is only part of the answer to our problem. Equally important is how and where and to whom it is distributed. In order to do this properly and most effectively a comprehensive program is now under way that will involve hundreds of C.I.M. members across Canada. It is for this program that the extra money is required. So that I will not be doing all the talking, I'm going to ask the secretary of our committee, Keith Buck, to read an outline of this program already approved and underway.

I think you will agree that our program is ambitious. To be effective our branch members and members at large must be provided with the necessary tools to make their personal contacts impressive and lasting.

The folder of educational brochures is one of the media by which we hope to do this.

Here is a sample of what we have in mind:

In addition to the cost of the folder we are going to require thousands of copies, not only of the folder itself, but also of all the brochures, pamphlets, etc. which it will contain.

It is for this reason that we are now asking you for $15,000.00, $3,000.00 more than we requested last year.

When you consider the magnitude and importance of the program we are undertaking and the time, energy and money that our own members are donating to it, our request is, we think, a reasonable and modest one.

We hope you will oblige us with a favourable decision today. We have not been idle during the past year and whether or not our work will bear fruit depends on your discussion today.

Thank you for hearing us again on this most important subject.

R. D. Hindson,
Chairman,
General Committee on Education,
C.I.M.

IS THERE A LACK OF INCENTIVE FOR YOUNG MEN TO GO INTO THE MINING INDUSTRY?

A few weeks ago, Dr. Paul-Emile Auger invited suggestions for topics to be discussed at this Conference. At that time, I made the following statement: "There is a lack of incentive for young men to go into the mining industry" and I was then incited by our chairman, Stuart Anderson, to enlarge on this statement.

There is certainly no need to describe the rareness of candidates in the mining industry. We are faced with a situation which Dr. Parker, President of C.I.M., so precisely called "a famine of engineers". Worse yet, a high percentage of our graduates leave the mining field at an early stage of their career to enter some other discipline.

In my opinion, two main causes are creating this abnormal situation:

(1) Inadequate remuneration

(2) Lack of interest in their assignments and therefore lack of incentive.

Remuneration

I tried to gather from the major eastern universities the average salaries paid to the graduates of the different engineering disciplines, but the only complete figures available immediately, were those of the Ecole Polytechnique.

Considering that, in 1964, this School produced 47% of all the Quebec engineering graduates, these figures are acceptable more especially so since the incomplete data received from the other universities tend to confirm these figures.

Discipline	Total Number of Graduates in Each Discipline			Number of Salaries Known (given by students)			Average Salary in Each Discipline (given)		
	1962	1963	1964	1962	1963	1964	1962	1963	1964
Civil	106	83	101	90	34	76	$431	$443	$473
Mechanics	52	63	50	39	45	46	$437	$440	$464
Electricity	50	64	63	48	55	53	$434	$433	$462
Chemistry	12	19	19	9	18	14	$428	$442	$463
Metallurgy	13	9	19	12	8	15	$424	$440	$466
Mining	22	8	9	22	4	8	$445	$494	$497
Geological	2	4	5	2	4	5	$490	$447	$456
Physics	14	9	8	9	8	7	$424	$491	$447
Totals and Average	271	259	274	231	176	224	$434	$440	$469

You will note that the difference in salary between the mining and the other disciplines is in the order of $30 a month, if you except geology and physics which actually are summer salaries given students pursuing their studies.

Let us not deceive ourselves. What candidate, in his right mind, will choose a discipline which offers him $1 a day more when actually, in the mining camps, the cost of living is higher and the other facilities are, in general, poorer?

This discrepancy is not only limited to the young mining graduates but to engineers with many years of experience. Referring to a bulletin published by the Federal Department of Labour in July 1964, we find that the average salary paid to the mining engineer, after

20 years of practice, is in the order of $10,700, while the metallurgical engineer gets $10,200 after 13.7 years and the mechanical engineer $9,600 after 12.4 years.

The average salary paid to the engineers of all disciplines, after 20 years practice, is $11,700—$1,000 more than the mining engineer.

It would appear that there is a tacit arrangement between different companies in order to pay a uniform remuneration. This is commendable providing the scale is not too low. It is therefore imperative that the executives get together and decide on a policy to improve the present salaries.

The second cause for the scarcity of engineers is the lack of interest in the work they are offered. Reading the paper delivered by Mr. John Kostuik, President of the Ontario Mining Association, I was delighted to find that such a prominent figure in the mining fraternity had so clearly and so concisely explained why the industry should make better use of the abilities of these young men and this, to their mutual advantage. In his paper entitled: "What the industry can do to help the young mining engineer", Mr. Kostuik came right to the point with the following statement and I quote:

> "Today's young engineering graduate is better equipped educationally to apply himself to a greater variety of technical tasks."

He also said:

> "Industry's approach that a young engineer be first proficient in use of a rock drill is good. Showing a "green man" how to drill a cut or how to operate a shuttle car correctly is basic, but the prevailing belief that he should remain at these operations in order to become a better handler of men, is wrong."

He added:

> "What has the young mining graduate of 1964 been trained to do sharply? He has been educated to recognize and to resolve problems, to pinpoint, structurally and mathematically, solutions for these problems. This has been the whole educative purpose of the modern "operations research" courses which have stretched his intellectual horizons. This is the kind of work which he has prepared himself to do in industry."

I would like to report an incident that happened to one of my graduates: he was sent underground to acquire experience, and kept there for 18 months until one day he became disgusted and quit. The manager candidly confessed that he had totally forgotten about this young engineer. I grant you that this does not speak for the young man's initiative but, on the other hand, it does not excuse the negligence or the indifference of the management.

What is being done to correct this unfortunate situation?

All the technical and professional associations are trying one way or another to promote the interest of the young people in the mineral industry. Federal and Provincial governments are also doing their best to help and we, of the universities, handicapped, due to the scarcity of students, are building up a course that is keeping pace with the other disciplines. The evolution of our education system has permitted the formation of young engineers who, in my opinion, are more qualified in many ways than their elders. We are, with all our energies, following up and keeping abreast with the rapid development of modern techniques.

What about the industry itself? Should it not be in the vanguard of this movement?

I grant you that few companies are beginning to change their policy. For example, they are rotating the young engineer through the different phases of their operation, and in so doing, find the best suitable place for the young man. This is indeed a good step towards improving the situation.

Nevertheless, in the majority of cases, such a procedure is not followed and the management is inclined to emphasize training in the operation of machinery and in the handling of men. They overlook the fact that two or three years of this regime will force this engineer into inefficiency. This not only means a loss of time and experience for the young man but also the loss for these companies of an opportunity to use an employee to his full capabilities.

All these efforts are indeed inadequate and, without the co-operation of the industry itself, I doubt very much that we can reach our objective. It is to be hoped that the industry will become more realistic and act accordingly.

Taking for granted the collaboration of the mineral industry, I believe that all the efforts of the above mentioned groups will inevitably lead to a duplication.

I would like to submit, for your approval, a suggestion which, I think, could be of great help:

Would it not be possible to form a new organization or give power to an already existing one to channel, on a national scale, all of these dispersed efforts? Such an action would avoid duplication and keep everyone informed as to what is being done. I will go as far as to suggest very strongly that this Committee take this initiative; the Mines Ministers' Conference, reuniting all the governments of Canada, the principal technical organizations, and a well-chosen group of executives of the mining industry, would appear to me as being ideally suited to inititate such a movement.

This organization, to be successful, would have to appoint a full-time experienced engineer, granting him all authority to operate adequately together with office facilities and financial reward in keeping with the work to be done. This co-ordinator, backed by a well-organized group, could render services of the highest order. He could undertake serious planning which would avoid duplication and help channel all these efforts for more effective results.

Actually, the Canadian Metal Mining Association has, in the field of mining research, taken the lead. I, for one, would like to pay them a special tribute.

Funds to implement my suggestion will, of course, be needed. But, shared by eleven governments and possibly the industry, it would indeed be reduced to a negligible factor.

In closing, this is a thought I leave with you gentlemen.

Paul E. Riverin,
Vice-Chairman of Education Committee

CLOSING PLENARY SESSION

The closing Plenary Session was held Wednesday, September 9th at 10:30 a.m. under the Chairmanship of the Honourable A. Russell Patrick. Mr. Patrick expressed his appreciation for the excellent turnout at the Conference and called on the Vice-Chairman, Mr. H. H. Somerville, to give the disposition by the Minister of the reports of the various working Committees. Mr. Patrick then thanked Mr. Sommerville and advised the Conference that a representation of Ministers would be presenting the resolutions to the Federal Minister of Mines and Technical Surveys at Ottawa, at a later date.

Dr. Paul-E. Auger expressed the appreciation of the delegates for secretarial services provided at the Conference.

Honourable G. C. Wardrope expressed appreciation for the social arrangements and ladies' activities arranged by the oil and gas industry.

Honourable Sterling R. Lyon complimented the Federal Minister of Mines and Technical Surveys and his staff on their participation at the Conference.

Honourable W. M. Benidickson expressed the thanks of the Department of Mines and Technical Surveys, Department of Industry and the Department of Northern Affairs for the courtesies during the Convention.

Honourable H. Graham Crocker moved a vote of thanks to the Minister of Mines and Minerals and the people of Alberta for the excellent manner in which their stay was made pleasant.

Honourable Donald L. Brothers, Minister of Mines and Petroleum Resources, Province of British Columbia extended the invitation to the Twenty-Second Annual Mines Ministers Conference to be held at the Empress Hotel, Victoria, from September 13th to 16th, 1965.

Mr. John Kostuik expressed appreciation on behalf of the Provincial Mining Associations for the invitation to the Mines Ministers Conference.

After a few closing remarks the Chairman declared the Twenty-First Annual Conference concluded.

BRIEF PRESENTED

TO

THE RIGHT HONOURABLE LESTER B. PEARSON

AND

THE HONOURABLE WILLIAM M. BENIDICKSON

WITH RESPECT TO

CERTAIN RECOMMENDATIONS

ARISING FROM

THE TWENTY-FIRST ANNUAL CONFERENCE

OF THE

PROVINCIAL MINISTERS OF MINES

1964

INTRODUCTION

On behalf of the Provincial Ministers of Mines we wish to express our appreciation for the opportunity of meeting with you to present certain recommendations arising out of the twenty-first Conference of Provincial Ministers of Mines held at Banff, Alberta from September 6th to September 9th, 1964.

We also wish to express our appreciation to Honourable Mr. William M. Benidickson for personally presenting the reply to the brief submitted to the Government of Canada following the Twentieth Conference.

The Twenty-first Conference discussed various problems of mutual interest to the Provinces relating to minerals exploration and the mining industry. Resulting from these discussions the following recommendations which require your attention were adopted by the Conference and these we respectfully submit to you.

MINING OPERATIONS

1. Ammonium Nitrate and Fuel Oil Order P.C. 1957-335 under the Explosives Act, requires that the assembling and blending of ammonium nitrate and fuel oil for use in open pit mines and quarries be carried out at the proposed blasting site for "immediate use". In many instances it is desirable that instead of the required immediate use, a specified short time for storage of the assembled and blended ammonium nitrate and fuel oil mixture be permitted.

The Committee therefore recommends:

That the Ministers request the Federal Explosives Division to reconsider P.C. 1957-335 and obtain an amendment so as to permit a specified short period of time within which assembled and blended ammonium nitrate and fuel oil mixtures may be stored when necessary rather than used immediately.

2. It has been determined that concentration in waters of as low as 600 parts per billion of zinc or 40 parts per billion of copper will kill young salmon, while 10% to 20% of these concentrations will cause avoidance of such contaminated waters by salmon. It has not been determined what effect such concentrations have on other fish, nor what effects pollutants other than zinc or copper emanating from mine waters have on fish.

The Committee therefore recommends:

That the Ministers request the Federal Department of Mines and Technical Surveys to carry out research into the problem of pollution of streams and lakes by mine waters in conjunction with the Federal Department of Fisheries.

GEOLOGY, GEOPHYSICS AND PROSPECTING

3. The Committee draws the attention of the Ministers to a booklet published in 1951 by the Geological Survey of Canada, which booklet contains geological symbols that have been widely used by geologists and others.

The Committee recommends:

That the Ministers ask the Geological Survey of Canada to revise the booklet and to publish a revised edition after consultation with the Provincial Departments of Mines.

ROYALTIES, TAXATION AND TARIFFS

4. **The Committee reaffirms last year's resolution:**

That the Provincial Ministers request the Government of Canada to repeal section 701 of the Income Tax Regulations and amend section 11(1) (p) of the Canadian Income Tax Act to provide that mining taxes and royalties paid to a Province be allowed in full as a deductible expense.

COAL

5. Whereas the representations by the Provincial Ministers of Mines to the Government of Canada in the matter of assistance to the coal industry and in the continuity of subventions have received favourable consideration; and

Whereas coal constitutes a major portion of Canada's energy reserve and the continuation of the present policies in these matters is of vital importance to the Canadian producers:

Therefore, be it resolved:

That the Provincial Ministers of Mines be respectfully requested to transmit to the Government of Canada the continued thanks and appreciation for the full measure of assistance given to the Canadian Coal Industry over the years, including the valuable services of the Dominion Coal Board, and to express the sincere hope that this sympathetic consideration will continue to be extended in the future.

All of which is respectfully submitted on behalf of the Provincial Ministers of Mines of Canada.

A. Russell Patrick
Chairman
21st Annual Conference of
Provincial Mines Ministers

October 7, 1964

Provincial Ministers of Mines

TWENTY-SECOND ANNUAL CONFERENCE

PROCEEDINGS

EMBER 12-15, 1965 * EMPRESS HOTEL * VICTORIA, BRITISH COLUMBIA

Proceedings

Twenty-second Annual Conference

of the

PROVINCIAL MINISTERS OF MINES

SEPTEMBER 12 TO 15, 1965

EMPRESS HOTEL

Victoria, British Columbia

Chairman of the Conference:

HONOURABLE D. L. BROTHERS

Minister of Mines and Petroleum Resources

Province of British Columbia

Secretary:

K. B. BLAKEY

Chief Gold Commissioner and

Chief Commissioner, Petroleum and Natural Gas

TABLE OF CONTENTS

DATES AND PLACES
of the
ANNUAL CONFERENCES
of the
PROVINCIAL MINISTERS OF MINES

Conference	*Date*	*Place*
First	April 14–16, 1945	Quebec, P.Q.
Second	November 22–23, 1945	Toronto, Ontario
Third	September 23–27, 1946	Winnipeg, Manitoba
Fourth	September 3–5, 1947	Keltic Lodge, Nova Scotia
Fifth	September 2–4, 1948	Jasper, Alberta
Sixth	September 7–10, 1949	Fredericton, New Brunswick
Seventh	September 13–16, 1950	Victoria, British Columbia
Eighth	September 4–8, 1951	Saskatoon, Saskatchewan
Ninth	September 15–17, 1952	Quebec, P.Q.
Tenth	September 16–18, 1953	Niagara Falls, Ontario
Eleventh	September 20–22, 1954	Winnipeg, Manitoba
Twelfth	September 12–14, 1955	Keltic Lodge, Nova Scotia
Thirteenth	September 10–12, 1956	Lake Louise, Alberta
Fourteenth	September 4–6, 1957	Vancouver, British Columbia
Fifteenth	September 3–5, 1958	St. Andrews, New Brunswick
Sixteenth	September 14–16, 1959	Regina, Saskatchewan
Seventeenth	October 16–19, 1960	Quebec, P.Q.
Eighteenth	September 17–20, 1961	Toronto, Ontario
Nineteenth	September 16–18, 1962	Winnipeg, Manitoba
Twentieth	September 15–18, 1963	Halifax, Nova Scotia
Twenty-first	September 6–9, 1964	Banff, Alberta
Twenty-second	September 12–15, 1965	Victoria, British Columbia

1968

PROVINCIAL MINISTERS OF MINES AND DEPUTY MINISTERS AT THE TIME OF THE TWENTY-SECOND ANNUAL CONFERENCE OF THE MINISTERS OF MINES

MINISTERS OF MINES

Honourable W. J. Keough	Minister of Mines, Agriculture and Resources, Newfoundland
Honourable Donald M. Smith	Minister of Mines, Nova Scotia
Honourable Lloyd G. McPhail	Minister of Industry and Natural Resources, P.E.I.
Honourable Daniel A. Riley, Q.C.	Minister of Lands and Mines, New Brunswick
Honourable Rene Levesque	Minister of Natural Resources, Quebec
Honourable G. C. Wardrope	Minister of Mines, Ontario
Honourable Sterling R. Lyon, Q.C.	Minister of Mines and Natural Resources, Manitoba
Honourable Alexander C. Cameron	Minister of Mineral Resources, Saskatchewan
Honourable A. Russell Patrick	Minister of Mines and Minerals, Alberta
Honourable Donald R. Brothers	Minister of Mines and Petroleum Resources, British Columbia

DEPUTY MINISTERS

Mr. Frederick Gover	Newfoundland
Dr. J. P. Nowlan	Nova Scotia
Mr. P. A. Murnaghan	Prince Edward Island
Mr. K. B. Brown	New Brunswick
Dr. P. E. Auger	Quebec
Mr. D. P. Douglass	Ontario
Mr. Stuart Anderson	Manitoba
Mr. J. T. Cawley	Saskatchewan
Mr. H. H. Somerville	Alberta
Mr. P. J. Mulcahy	British Columbia

CONFERENCE ORGANIZING COMMITTEE

CHAIRMAN

HONOURABLE DONALD L. BROTHERS

SECRETARY

K. B. BLAKEY

Chief Gold Commissioner and
Chief Commissioner, Petroleum and Natural Gas

PROGRAMME

DR. H. SARGENT

LADIES' COMMITTEE

Mrs. D. L. Brothers

Mrs. P. J. Mulcahy

SECRETARIAT

Mr. C. R. Stephens
Miss D. Burton
Mrs. G. F. Chapman
Mrs. E. A. Faulks
Mrs. V. A. Lien
Mrs. R. J. Moir
Mrs. M. E. Nelles
Mrs. J. Rolfe
Mrs. D. R. Timbres

PROGRAMME

Sunday, September 12th

10 a.m.–8 p.m.:

REGISTRATION.

MEETINGS OF MINISTERS AND DEPUTIES AT CALL OF THE CHAIRMAN.

10 a.m.:

LANDS SUB-COMMITTEE OF COMMITTEE No. 5.

TECHNICAL SUB-COMMITTEE OF COMMITTEE No 5.

2 p.m.: COMMITTEE ON COLLECTION OF STATISTICS.

8–10 p.m.: COFFEE PARTY.

Ladies and gentlemen.
(Compliments of *Western Miner* and Western Miner Press Ltd.)

Monday, September 13th

9 a.m.–5 p.m.: REGISTRATION.

9 a.m.: OPENING SESSION.

Chairman, the Honourable Donald L. Brothers.

Welcome and Introductions.

"Factors in the Future Prosperity of Canada's Mineral Industry," by W. S. Kirkpatrick, President, The Consolidated Mining and Smelting Company of Canada, Limited.

11 a.m.: COMMITTEE MEETINGS.

No. 1: Problems Relating to Mining Operations.

No. 2: Problems Relating to Exploration and Development.

No. 3: Royalties, Taxation, and Tariffs.

No. 4: Coal.

No. 5: Petroleum and Natural Gas.

No. 6: Education.

12.30–1.45 p.m.: LUNCHEON.

Ladies and gentlemen.
(Compliments of The Consolidated Mining and Smelting Company of Canada, Limited.)

Address of welcome, Alderman Millard Mooney.

"The Shortage of Engineers," Professor P. M. Dranchuk, Department of Chemical and Petroleum Engineering, University of Alberta.

2 p.m.: COMMITTEE MEETINGS.

6–7 p.m.: RECEPTION.

Ladies and gentlemen.

(Compliments of the Mining Association of British Columbia.)

8.15 p.m.: GENERAL DISCUSSION.

"Education and the Mineral Industry."

Discussion led by:

Mr. E. C. Roper, Principal, British Columbia Institute of Technology.

Professor C. L. Emery, Department of Mineral Engineering, University of British Columbia.

Professor L. G. R. Crouch, Department of Mineral Engineering, University of British Columbia.

Professor P. M. Dranchuk, Department of Chemical and Petroleum Engineering, University of Alberta.

Tuesday, September 14th

9 a.m.: Committees to reconvene at the call of chairmen.

6–7 p.m.: RECEPTION.

Ladies and gentlemen.

(Compliments of the Canadian Petroleum Association and Independent Petroleum Association of Canada.)

7.30 p.m.: BANQUET.

(Compliments of the Government of the Province of British Columbia.)

Address by the Honourable Ralph R. Loffmark, Minister of Industrial Development, Trade, and Commerce.

9.30 p.m.: DANCING.

Wednesday, September 15th

10 a.m.: FINAL SESSION.

Chairman, the Honourable Donald L. Brothers.

Address by the Honourable J. Watson MacNaught, Minister of Mines and Technical Surveys.

LIST OF DELEGATES
REGISTERED AT THE MINES MINISTERS' CONFERENCE

NEWFOUNDLAND

Gover, Mr. Frederick	Dept. of Mines, Agriculture and Resources
Howse, Mr. C. K.	Iron Ore Company of Canada
Macdonald, Mr. Roderick D.	Labrador Mining and Exploration Co. Ltd.
McKillop, Mr. John H.	Dept. of Mines, Agriculture and Resources
Trevor, Mr. Brian J.	Dept. of Mines, Agriculture and Resources

NOVA SCOTIA

Smith, Hon. Donald M.	Dept. of Mines
Nowlan, Dr. J. P.	Dept. of Mines
Brown, Mr. Edward D.	National Gypsum (Canada) Ltd.
Goudge, Mr. M. Grant	Dept. of Mines
Wright, Mr. J. D.	Dept. of Mines

NEW BRUNSWICK

Riley, Hon. Daniel A., Q.C.	Dept. of Lands and Mines
Clements, Mr. C. S.	Dept. of Lands and Mines
Coughlan, Mr. E. K.	Dept. of Lands and Mines
Friars, Mr. John R.	Newcastle Mining Co.
McCullough, Mr. Gordon R.	Heath Steele Mines Limited
O'Leary, Mr. L. S.	Dept. of Lands and Mines
Scott, Mr. C. Eldon	Miramichi Lumber Company (Limited)
Smith, Mr. J. C.	Dept. of Lands and Mines
Spence, Mr. W. I.	Dept. of Lands and Mines
Streeter, Mr. Percival	Avon Coal Company Limited
Warren, Mr. R. W.	Dept. of Lands and Mines

QUEBEC

Auger, Dr. P. E.	Dept. of Natural Resources
Beliveau, Mr. Lucien C.	Nigadoo River Mines
Bellemare, Mr. J. Maurice	Dept. of Natural Resources
Carter, Mr. Frank H.	Wabush Mines
Cooke, Mr. Fred G.	Quebec Metal Mining Association
Cunningham, Mr. Clive D.	Dominion Coal Company Limited
Fafard, Mr. Jacques	Dept. of Trade and Commerce
Farnsworth, Mr. D. A.	Dept. of Natural Resources
Filteau, Mr. Paul A.	Quebec Asbestos Mining Association
Gilbert, Mr. J. E.	Dept. of Natural Resources

Grenier, Dr. Paul E.	Dept. of Natural Resources
Kirkpatrick, Mr. W. S.	The Consolidated Mining and Smelting Company of Canada, Limited
Langevin, Mr. Robert, Q.C.	Dept. of Natural Resources
Langlois, Mr. L. G.	Quebec Metal Mining Association
Moore, Mr. G. N.	The Consolidated Mining and Smelting Company of Canada, Limited
O'Connell, Mr. Francis J.	Sigma Mines (Quebec) Limited
Selwyn, Mr. John C.	Canada Cement Company Limited
Shaw, Mr. R.	Canadian Industries Limited
Tapp, Mr. E. Gordon	The Canadian Institute of Mining and Metallurgy
Tetu, Mr. Jean	Dept. of Natural Resources

ONTARIO

Wardrope, Hon. G. C.	Dept. of Mines
Douglass, Mr. D. P.	Dept. of Mines
Arnold, Mr. Walter P.	Rio Algom Mines Ltd.
Boone, Mr. A. E.	Joy Manufacturing Company (Canada) Limited
Brittain, Mr. William D.	Dept. of Energy and Resources Management
Brown, Mr. L. Carson	Dept. of Mines
Buckle, Mr. Frank	Ontario Mining Association
Burns, Mr. C. A.	San Antonio Gold Mines Limited
Colpitts, Mr. Gordon L.	Imperial Oil Limited
Durocher, Mr. Roland	Jones & Laughlin Steel Corporation
Foo, Mr. Edmund	Trans-Canada Pipe Lines Limited
Fraser, Mr. Horace J.	Falconbridge Nickel Mines Limited
Giffen, Mr. J. A.	Ontario Petroleum Institute Inc.
Hurst, Dr. M. E.	Dept. of Mines
Johnston, Mr. Ashton W.	Metal Mines Ltd.
Joubin, Mr. Frank	Bralorne Pioneer Mines Ltd.
Lee, Mr. Brady C.	Dept. of Mines
Morris, Mr. Rowland	Mine Safety Appliances Co. of Canada Limited
Perry, Mr. E. A.	Ontario Mining Association
Redmond, Mr. John F.	Shell Canada Ltd.
Riddell, Mr. George S.	Dept. of Mines
Riddell, Dr. J. E.	Mount Pleasant Mines Limited
Scott, Mr. Ralph V.	Dept. of Mines
Sharp, Mr. D. A.	Dept. of Energy and Resources Management
Smith, Mr. Robert L.	Dept. of Mines
Stuart, Mr. William D.	Canadian Petroleum Association
Wansbrough, Mr. Victor C.	The Mining Association of Canada

MANITOBA

Lyon, Hon. Sterling R., Q.C.	Dept. of Mines and Natural Resources
Anderson, Mr. Stuart	Dept. of Mines and Natural Resources
Austin, Mr. Eric S.	Hudson Bay Mining and Smelting Co., Limited
Cain, Mr. Peter A.	Sherritt Gordon Mines Limited
Clarke, Mr. John W.	Paradise Petroleums Ltd.
Davies, Dr. James F.	Dept. of Mines and Natural Resources
Dawson, Mr. Arthur S.	Consulting Geologist
Hegion, Mr. Steve	Hegion & Associates Ltd.
Junker, Mr. R. H.	Dept. of Mines and Natural Resources
Koffman, Mr. Albert A.	Consulting Exploration and Mining Geologist
Peterson, Mr. Harry W.	International Nickel Co. of Canada Ltd.
Richards, Mr. J. S.	Dept. of Mines and Natural Resources
Roper, Mr. John S.	Mid-West Metal Mining Association
Thompson, Mr. Crawford M.	Manitoba and Saskatchewan Coal Company (Limited)
Tomkins, Mr. Harry A.	Canadian National Railways

SASKATCHEWAN

Cameron, Hon. Alexander C.	Dept. of Mineral Resources
Cawley, Mr. James T.	Dept. of Mineral Resources
Coons, Mr. R. M.	Dept. of Mineral Resources
Davidson, Mr. C. Roberts	Alwinsal Potash of Canada Limited
Edmonds, Mr. Byron P.	Kalium Chemicals Limited
Fuller, Mr. Donald L.	Producers Pipelines Ltd.
Goza, Mr. J. B.	South Saskatchewan Pipe Line Co.
Jack, Mr. Peter S.	Potash Company of America
Lee, Mr. Jean L.	Canadian Petroleum Association
MacIver, Mr. Murdo	Socony Mobil Oil of Canada, Ltd.
MacNicol, Mr. James M.	Canadian Petroleum Association
Mode, Mr. Don H.	Dept. of Mineral Resources
Morrow, Dr. Harold F.	Consultant
Page, Mr. Lowell	U.S. Borax & Chemical Corp.
Powell, Mr. L. C.	Marathon Oil Company
Powell, Mr. L. Wayne	The British American Oil Company Ltd.
Smith, Mr. David G.	Dept. of Mineral Resources
Tyerman, Mr. David M.	MacPherson, Leslie & Tyerman
Wotherspoon, Mr. J. G.	Dept. of Mineral Resources

ALBERTA

Patrick, Hon. A. Russell	Dept. of Mines and Minerals
Somerville, Mr. Hubert H.	Dept. of Mines and Minerals
Abercrombie, Mr. Robin J.	Independent Petroleum Association of Canada
Anderson, Mr. Arthur C.	Canadian Kewanee Limited
Badyk, Mr. Joseph S.	Canada-Cities Service Petroleum Corporation
Bailey, Mr. R. Bruce	Champlin Petroleum Company

Beck, Mr. August F.	Canadian Export Gas & Oil Ltd.
Booth, Mr. Harry	Pembina Pipe Lines Ltd.
Brandt, Mr. R. Don	Trans Prairie Pipelines Ltd.
Brant, Mr. Glenn S.	Prairie Oil Royalties Company Ltd.
Bredin, Mr. Edward M.	Canadian Petroleum Association
Brett, Mr. Floyd	Sinclair Canada Oil Company
Brinker, Mr. W. F.	Canadian Kewanee Limited
Bristow, Mr. A. B., Jr.	Canadian Petroleum Association
Brown, Mr. Leonard I.	The California Standard Company
Conder, Mr. H. S.	Canadian Industrial Gas & Oil Ltd.
Connor, Mr. Eric J.	Independent Petroleum Association of Canada
Cowper, Mr. Norman W.	Consumers' Co-operative Refineries Ltd.
Crozier, Mr. Lance L.	Independent Petroleum Association of Canada
Donnelly, Mr. C. W.	Marathon Oil Company
Dranchuk, Prof. P. M.	University of Edmonton
Dutton, Mr. Joseph A.	Dept. of Mines and Minerals
Ebbels, Mr. John C.	Shell Canada Limited
Elser, Mr. William A.	Whitehall Canadian Oils Ltd.
Erbarth, Mr. Walter	Wintershall Oil of Canada Ltd.
Ewart, Mr. T. G.	The Crow's Nest Pass Coal Company, Limited
Finland, Mr. G. H.	The Alberta and Northwest Chamber of Mines
Fraser, Mr. S. A.	Alberta Coal Ltd.
Friley, Mr. William A.	Independent Petroleum Association of Canada
Frocklage, Mr. R. J.	Canadian Petroleum Association
Fuller, Mr. Ken W.	Oil and Gas Conservation Board
Gallagher, Mr. Edward J.	The British American Oil Company Limited
Gallagher, Mr. Jack P.	Independent Petroleum Association of Canada
Germond, Mr. Kenneth W.	Uno-Tex Petroleum Corporation
Govier, Dr. George W.	Oil and Gas Conservation Board
Green, Mr. William H.	Gibson Petroleum Company Limited
Grossman, Mr. William L.	Canadian Petroleum Association
Guyer, Mr. J. E.	Guyer Oil Co.
Hamilton, Mr. William T.	French Petroleum Company of Canada Ltd.
Hardy, Mr. John F.	Central-Del Rio Oils Limited
Harvie, Mr. Donald S.	Canadian Fina Oil Limited
Horte, Mr. V. L.	Trans Canada Pipelines Ltd.
Huffman, Mr. M. Jack	Imperial Oil Limited
Humphries, Mr. R. Gordon	Toronto-Dominion Bank
Johnson, Mr. Ronald D.	R. D. Johnson & Associates Ltd.
Jordan, Mr. Dale R.	Dept. of Mines and Minerals
Jukes, Mr. A. H.	Bralorne Pioneer Petroleums
Lake, Mr. Harold	Eldorado Mining & Refining Co.
Lamb, Mr. Keith	Canadian Petroleum Association
Lebel, Mr. J. Louis	The California Standard Company
Lee, Mr. Charles S.	Canadian Petroleum Association

Lewis, Mr. D. Edwin	Canadian Petroleum Association
McCardell, Mr. Stan T.	Texaco Exploration Company
MacDonald, Mr. Bruce A.	Canadian Delhi Oil Ltd.
McDonald, Mr. Paul C.	Murphy Oil Company Ltd.
MacKenzie, Mr. W. Donald C.	Imperial Oil Limited
McKinnon, Mr. Fred A.	Canadian Petroleum Association
Macleod, Mr. Norman A., Q.C.	Alberta Oil and Gas Conservation Board
McMullen, Mr. Sydney G.	Amalgamated Coals Limited
Manyluk, Mr. A. Frank	Alberta Oil and Gas Conservation Board
Maybin, Mr. John E.	Canadian Western Natural Gas Company Limited
Miller, Mr. Lloyd E.	Sun Oil Company
Murray, Mr. R. C.	Amerada Petroleum Corporation
Panchysyn, Mr. E. J.	Alberta Coal Ltd.
Patrick, Mr. John W.	Dept. of Mines and Minerals
Patrick, Mr. O. H.	Amalgamated Coals Limited
Porter, Mr. John D.	Canadian Association of Oilwell Drilling Contractors
Poyen, Mr. John S.	Imperial Oil Limited
Proctor, Mr. John W.	Canadian Petroleum Association
Rasmussen, Mr. L. Merrill	Canadian Petroleum Association
Rawlins, Mr. J. C.	Peace River Oil Pipe Line Co. Ltd.
Richards, Mr. L. J.	Hudson's Bay Oil & Gas Co. Ltd.
Richardson, Mr. Roland J.	United Canso Oil & Gas Ltd.
Ridley, Mr. R. M.	Pan American Petroleum Corporation
Rudolph, Mr. John C.	Banff Oil Ltd.
Schmidt, Mr. Peter G.	Dept. of Mines and Minerals
Scott, Mr. E. W.	Union Oil Company of Canada Ltd.
Seaton, Mr. Robert A.	Dept. of Mines and Minerals
Starratt, Mr. F. E.	Lowe Petroleum Engineers of Canada Ltd.
Stephens, Mr. Robert M.	Tenneco Oil & Minerals, Ltd.
Stewart, Mr. Alex G.	Stewart, Weir, Stewart & Watson
Stoian, Mr. E.	Oil and Gas Conservation Board
Stuart, Mr. Gerry C.	Canadian Petroleum Association
Swann, Mr. Richard H.	Canadian Petroleum Association
Theriault, Mr. George H.	The Atlantic Refining Company
Westfall, Mr. Wes F.	Canadian Petroleum Association
White, Mr. G. I.	Seafort Petroleums Ltd.
Williams, Mr. Charles D.	Tenneco Oil & Minerals, Ltd.
Williams, Mr. F. James	Consumers' Co-operative Refineries Ltd.

BRITISH COLUMBIA

Brothers, Hon. D. L.	Dept. of Mines and Petroleum Resources
Mulcahy, Mr. P. J.	Dept. of Mines and Petroleum Resources
Bacon, Dr. William R.	Mastodon-Highland Bell Mines Limited
Benson, Mr. Norman	Western Miner

Blakey, Mr. K. B.	Dept. of Mines and Petroleum Resources
Bonar, Mr. Robert	Dept. of Mines and Petroleum Resources
Cameron, Mr. Douglas N.	Cameron McMynn Ltd.
Campbell, Mr. C. M., Jr.	Western Mines Ltd.
Cosburn, Mr. Stephen	Dept. of Mines and Petroleum Resources
Crouch, Prof. L. G. R.	University of British Columbia
Crowhurst, Mr. Jack J.	Mastodon-Highland Bell Mines Limited
Davenport, Mr. George H.	Bralorne Pioneer Mines Limited
Elliott, Mr. Thomas	British Columbia and Yukon Chamber of Mines
Emery, Prof. Charles L.	University of British Columbia
Goodwin, Mr. Frank L.	The Consolidated Mining and Smelting Company of Canada, Limited
Gordon, Mr. Gerald A.	Canadian Exploration Limited
Gower, Dr. J. A.	Kennco Explorations (Western) Limited
Greenlee, Mr. B. B.	The Anaconda Company (Canada) Ltd.
Hedley, Dr. M. S.	Dept. of Mines and Petroleum Resources
Holland, Dr. Stuart S.	Dept. of Mines and Petroleum Resources
Huestis, Mr. H. H.	Bethlehem Copper Corporation Ltd. (N.P.L.)
Hurd, Mr. E. Cecil	Trans Mountain Oil Pipe Line Co.
Hurdle, Mr. Bruce	The Consolidated Mining and Smelting Company of Canada, Limited
Imrie, Mr. B. S.	Peso Silver Mines Ltd.
Ingram, Mr. W. L.	Dept. of Mines and Petroleum Resources
Irwin, Mr. William S.	Dept. of the Attorney-General
Jewitt, Mr. William G.	Pine Point Mines
Laidman, Mr. Wilfred M.	Scurry-Rainbow Oil (Sask.) Ltd.
Lineham, Mr. John D.	Dept. of Mines and Petroleum Resources
McCrimmon, Mr. R. H.	Dept. of Mines and Petroleum Resources
McCutcheon, Mr. Archie	Cameron McMynn Ltd.
McDonald, Mr. Alex J.	Cameron McMynn Ltd.
MacDonald, Oswood G.	Cowichan Copper Co. Ltd.
MacDonald, Mr. John D.	Mining Association of British Columbia
McGillivray, Mr. G. Bertram	Canadian Petroleum Association
Macintyre, Mr. Oscar G.	Chamber of Mines of Eastern B.C.
McLeod, Mr. R. Roy	Dept. of Mines and Petroleum Resources
Mason, Mr. Miller H.	The Consolidated Mining and Smelting Company of Canada, Limited
Mitchell, Mr. C. H.	Mining Association of British Columbia
Moss, Mr. Robert E.	Dept. of Mines and Petroleum Resources
Peck, Mr. J. William	Dept. of Mines and Petroleum Resources
Perry, Mr. Charles A.	Dept. of Finance
Porter, Mr. Robinson M.	The Consolidated Mining and Smelting Company of Canada, Limited
Postle, Mr. Lawrence	The Granby Mining Company Limited
Pryde, Mr. William	Canadian Industries Limited
Roper, Mr. E. Cecil	British Columbia Institute of Technology

Salter, Mr. John H.	The Consolidated Mining and Smelting Company of Canada, Limited
Sargent, Dr. Hartley	Dept. of Mines and Petroleum Resources
Shaak, Mr. Alex	Shaak Construction Co.
Stephens, Mr. Clifford R.	Dept. of Mines and Petroleum Resources
Tomczak, Mr. John F.	Dept. of Mines and Petroleum Resources
Thomson, Mr. James	Bralorne Pioneer Mines Limited
Tough, Mr. W. James	Wesfrob Mines Limited
Walker, Mr. Arnold	Texada Mines Ltd.
Wearing, Mr. Theodore R.	Brynnor Mines Ltd.
Wilson, Mr. Walter	Dept. of Industrial Development, Trade, and Commerce

CANADA

MacNaught, Hon. J. Watson	Dept. of Mines and Technical Surveys
van Steenburgh, Dr. W. E.	Dept. of Mines and Technical Surveys
Andrews, Mr. G. W.	Dominion Bureau of Statistics
Berlinguette, Mr. Vincent R.	Dominion Bureau of Statistics
Brown, Mr. Alexander	Dept. of Mines and Technical Surveys
Buck, Mr. W. Keith	Dept. of Mines and Technical Surveys
Convey, Mr. John	Dept. of Mines and Technical Surveys
Christie, Mr. K. J.	Dept. of Northern Affairs and National Resources
Crosby, Dr. D. G.	Dept. of Northern Affairs and National Resources
Deir, Mr. A. R.	Dominion Bureau of Statistics
Drolet, Mr. Jean-Paul	Dept. of Mines and Technical Surveys
Fortier, Dr. Yves O.	Dept. of Mines and Technical Surveys
Forward, Prof. F. A.	Privy Council
Fraser, Mr. E. J.	Dept. of Mines and Technical Surveys
Gilchrist, Mr. William M.	Eldorado Mining and Refining Limited
Gould, Miss Rose	Dept. of Mines and Technical Surveys
Harrison, Dr. J. M.	Dept. of Mines and Technical Surveys
Hindson, Mr. Ralph D.	Dept. of Industry
Hodgson, Mr. E. C.	Dept. of Mines and Technical Surveys
Hunt, Mr. A. D.	Dept. of Northern Affairs and National Resources
Irwin, Dr. Arthur B.	Dept. of Citizenship and Immigration
Karney, Mr. William M.	National Energy Board
MacInnes, Mr. J. P.	Dept. of Mines and Technical Surveys
Monture, Dr. G. C.	Atlantic Development Board
O'Brian, Mr. C. Lewis	Dept. of Mines and Technical Surveys
Robinson, Dr. Stephen C.	Dept. of Mines and Technical Surveys
Stabback, Mr. J. G.	National Energy Board
Toombs, Mr. Ralph B.	Dept. of Mines and Technical Surveys
Troy, Mr. Orval	Dept. of Mines and Technical Surveys

UNITED STATES OF AMERICA

Callahan, Dr. William H.	New Jersey Zinc Exploration Company (Canada) Limited
Goranson, Dr. Edward	New Jersey Zinc Exploration Company (Canada) Limited
Lambly, Mr. C. A.	Reeves McDonald Mines Limited
Mollison, Mr. Richard D.	Texas Gulf Sulphur Company
Seibert, Mr. Kenneth T.	Sybouts Sodium Sulphate Co.
Towers, Mr. John	Heath Steele Mines Limited
Upham, Mr. M. A.	Granduc Mines Limited

LIST OF LADIES PRESENT

NEWFOUNDLAND

Gover, Mrs. Frederick
Howse, Mrs. C. K.
Macdonald, Mrs. Roderick D.

NOVA SCOTIA

Brown, Mrs. Edward D.
Nowlan, Mrs. J. P.
Wright, Mrs. J. D.

NEW BRUNSWICK

Friars, Mrs. John R.
McCullough, Mrs. Gordon R.
Riley, Mrs. Daniel A.
Scott, Mrs. C. Eldon
Smith, Mrs. J. C.

QUEBEC

Beliveau, Mrs. Lucien C.
Cooke, Mrs. Fred G.
Filteau, Mrs. Paul A.
Kirkpatrick, Mrs. W. S.
Langevin, Mrs. Robert
Langlois, Mrs. L. G.
O'Connell, Mrs. Francis J.
Tetu, Mrs. Jean

ONTARIO

Arnold, Mrs. Walter P.
Boone, Mrs. A. E.
Brown, Mrs. L. Carson
Buckle, Mrs. Frank
Colpitts, Mrs. Gordon L.
Douglass, Mrs. D. P.
Foo, Mrs. Edmund
Giffen, Mrs. J. A.
Lee, Mrs. Brady C.
Morris, Mrs. Rowland
Perry, Mrs. E. A.
Redmond, Mrs. John F.
Scott, Mrs. Ralph V.
Smith, Mrs. Robert L.
Stuart, Mrs. William D.
Wansbrough, Mrs. Victor C.
Wardrope, Mrs. George C.

MANITOBA

Anderson, Mrs. Stuart
Austin, Mrs. Eric S.
Cain, Mrs. Peter A.
Dawson, Mrs. Arthur S.
Hegion, Mrs. Steve
Koffman, Mrs. Albert A.
Lyon, Mrs. Sterling R.
Peterson, Mrs. H. W.
Richards, Mrs. J. S.
Roper, Mrs. John S.
Thomson, Mrs. Crawford M.
Tomkins, Mrs. Harry A.

SASKATCHEWAN

Cawley, Mrs. James T.
Davidson, Mrs. C. Roberts
Edmonds, Mrs. Byron P.
Fuller, Mrs. Donald L.
Goza, Mrs. J. B.
Jack, Mrs. Peter S.
Lee, Mrs. Jean L.
MacIver, Mrs. Murdo
MacNicol, Mrs. James M.
Morrow, Mrs. Harold F.
Powell, Mrs. Larry C.
Powell, Mrs. L. Wayne
Tyerman, Mrs. David M.
Wotherspoon, Mrs. J. G.

ALBERTA

Abercrombie, Mrs. Robin J.
Anderson, Mrs. Arthur C.
Badyk, Mrs. Joseph S.
Beck, Mrs. August F.
Booth, Mrs. Harry
Brandt, Mrs. R. Don
Bredin, Mrs. Edward M.
Brett, Mrs. Floyd
Brinker, Mrs. W. F.
Bristow, Mrs. Arthur B., Jr.
Brown, Mrs. Leonard I.
Conder, Mrs. H. S.
Connor, Mrs. Eric J.
Cowper, Mrs. Norman W.
Crozier, Mrs. Lance L.
Donnelly, Mrs. C. W.
Dutton, Mrs. Joseph A.
Ebbels, Mrs. John C.
Elser, Mrs. William A.
Erbarth, Mrs. Walter
Ewart, Mrs. T. G.
Finland, Mrs. G. H.
Fraser, Mrs. S. A.
Friley, Mrs. William A.

Frocklage, Mrs. Ray J.
Gallagher, Mrs. Edward J.
Gallagher, Mrs. Jack P.
Germond, Mrs. Kenneth W.
Govier, Mrs. George W.
Grossman, Mrs. William L.
Guyer, Mrs. J. E.
Hamilton, Mrs. William T.
Hardy, Mrs. John F.
Harvie, Mrs. Donald S.
Horte, Mrs. V. L.
Huffman, Mrs. M. Jack
Humphries, Mrs. R. Gordon
Jukes, Mrs. A. H.
Lake, Mrs. Harold
Lamb, Mrs. Keith
Lebel, Mrs. J. Louis
Lee, Mrs. Charles S.
Lewis, Mrs. D. Edwin
McCardell, Mrs. Stan T.
Macdonald, Mrs. Bruce A.
McDonald, Mrs. Paul C.
MacKenzie, Mrs. W. Donald C.
McKinnon, Mrs. Fred A.
McMullen, Mrs. Sydney G.
Manyluk, Mrs. A. Frank
Maybin, Mrs. John E.
Miller, Mrs. Lloyd E.
Murray, Mrs. R. C.
Panchysyn, Mrs. E. J.
Patrick, Mrs. A. Russell
Patrick, Mrs. John W.
Patrick, Mrs. O. H.
Porter, Mrs. John D.
Poyen, Mrs. John S.
Proctor, Mrs. John W.
Rasmussen, Mrs. L. Merrill
Rawlins, Mrs. J. C.
Richards, Mrs. L. J.
Richardson, Mrs. Roland J.
Rudolph, Mrs. John C.
Schmidt, Mrs. Peter G.
Scott, Mrs. E. W.
Somerville, Mrs. Hubert H.
Starratt, Mrs. F. E.
Stewart, Mrs. Alex G.
Stuart, Mrs. Gerry C.
Swann, Mrs. Richard H.
Theriault, Mrs. George H.
Westfall, Mrs. W. F.
White, Mrs. G. I.
Williams, Mrs. F. James

BRITISH COLUMBIA

Bacon, Mrs. William R.
Benson, Mrs. Norman
Blakey, Mrs. K. B.
Bonar, Mrs. Robert
Brothers, Mrs. D. L.
Cameron, Mrs. Douglas N.
Campbell, Mrs. C. M., Jr.
Cosburn, Mrs. Stephen
Crowhurst, Mrs. Jack J.
Davenport, Mrs. George H.
Emery, Mrs. Charles L.
Gordon, Mrs. Gerald A.
Gower, Mrs. J. A.
Greenlee, Mrs. B. B.
Hedley, Mrs. M. S.
Holland, Mrs. S. S.
Huestis, Mrs. H. H.
Hurdle, Mrs. Bruce
Imrie, Mrs. B. S.
Ingram, Mrs. W. L.
Irwin, Mrs. William S.
Jewitt, Mrs. William G.
Lineham, Mrs. John D.
McCrimmon, Mrs. R. H.
McCutcheon, Mrs. Archie
McDonald, Mrs. Alex J.
MacDonald, Mrs. Oswood G.
McDonald, Mrs. John D.
McGillivray, Mrs. G. Bertram
Macintyre, Mrs. Oscar G.
McLeod, Mrs. R. Roy
Mason, Mrs. Miller H.
Mitchell, Mrs. C. H.
Moss, Mrs. Robert E.
Mulcahy, Mrs. P. J.
Peck, Mrs. J. William
Perry, Mrs. Charles A.
Porter, Mrs. Robinson M.
Postle, Mrs. Lawrence
Pryde, Mrs. William
Roper, Mrs. E. Cecil
Salter, Mrs. John H.
Sargent, Mrs. Hartley
Stephens, Mrs. Clifford R.
Tomczak, Mrs. John F.
Thomson, Mrs. James
Tough, Mrs. W. James
Waddington, Mrs. George
Walker, Mrs. Arnold
Wearing, Mrs. Theodore R.
Wilson, Mrs. Walter

CANADA

Brown, Mrs. Alexander
Fortier, Mrs. Yves O.
Forward, Mrs. F. A.
Gilchrist, Mrs. W. M.
Gould, Miss Rose
Harrison, Mrs. J. M.
Irwin, Mrs. Arthur B.
MacInnes, Mrs. J. P.
MacNaught, Mrs. J. Watson
O'Brian, Mrs. C. Lewis
Stabback, Mrs. J. G.
Troy, Mrs. Orval
van Steenburgh, Mrs. W. E.

UNITED STATES

Lambly, Mrs. C. A.
Towers, Mrs. John
Upham, Mrs. M. A.

OPENING PLENARY SESSION

Chairman: Hon. D. L. Brothers
Minister of Mines and Petroleum Resources
Province of British Columbia

September 13, 1965, 9 a.m.

The chairman addressed the meeting as follows:—

It is a real pleasure for me to say "Welcome to British Columbia" to our many guests today, on behalf of the Government of British Columbia. Especially is this so in the case of our new Federal Minister, Mr. MacNaught. May I take this opportunity to introduce to you the Ministers of Mines from the Provinces of Canada who are here today.

We have been working hard for months preparing for this conference and sincerely hope you will find everything to your liking.

This spring when a ministerial delegation from British Columbia visited the charming and delightful country of Japan, we were introduced to a rather unusual custom. That was "Japanese punctuality." This Japanese custom will, I hope, be the "order of the day" during this conference. All events *will* start on time. I ask all committee chairmen to adhere to this rule strictly. If there are only three delegates at your committee room at the appointed time, please start anyway. I can assure you that all major events will be started on time. To the delegates: If you think you can be 10 minutes late and still make the meeting on time—don't try—it just won't work.

We have purposely scheduled the programme so that time is of the essence. We have done this so that you will work hard, but at the same time we want you to see something of our beautiful Province and the world-famous City of Victoria. We have also arranged entertainment for you and have tried to leave you several free hours tomorrow afternoon for golfing, shopping, or just plain sightseeing. We are also leaving the dinner hour free tonight so that you can eat at a place of your choice. Now that we have planned your visit so carefully, will you please co-operate by following that Japanese custom of promptness.

I will resist the temptation to brag about the wonders of our extraordinary Province. I should tell you, however, that we are much larger than the State of Texas in land area. To be exact, we have 359,279 square miles against 262,398 square miles in the Lone Star State. British Columbia's land area is greater than that of the States of California, Oregon, and Washington combined.

We are the fastest-growing Province, with the population increase as of April, 1965, of 3 per cent, the highest of any Province and two-thirds above the 1.8 per-cent National average.

We have the largest ferry fleet in Canada and are busy building more ships. Several years ago we had one university, and, presto, we now have four. We have one of the largest hydro-electric development programmes under way in the world. We have the largest pulp and paper development going on in the world. We have the finest weather in Canada.

But if I continue along this vein, you will surely accuse me of bragging about our Province, so I will turn my attention to a few remarks on mining and petroleum in British Columbia.

In British Columbia the mineral industry is our number two revenue producer, being exceeded only by our rapidly expanding forestry industry. In 1964 the mining value of $267.1 million is up 56 per cent since 1952. The present period of successive annual increases began in 1959, and beginning with 1962 the value each year has been greater than for any preceding year. It is anticipated that 1965 will also exceed any preceding year. Exploration has been carried on at a lively pace for more than a decade. Long-established companies have continued their exploration operations, and many new companies have entered the field, opening offices in British Columbia and carrying on active exploration programmes.

In the last year several major mining properties have been brought into production. The estimated cost of bringing nine mines into production in the period 1965–69 will exceed $160 million. Mount Washington, a copper producer, commenced operations on Vancouver Island in December. The Boss Mountain molybdenum property came into production in May and the Endako molybdenum producer in midsummer. The Yreka copper property on northern Vancouver Island will be brought into production before the end of 1965. The Torwest molybdenum property at Rossland is being prepared for production at this time. Granisle (copper), Tasu (iron with by-product copper), and Western (with copper, zinc, and gold) are scheduled to come into production in 1966. The Lime Creek molybdenum property is scheduled for 1967 and the Granduc copper property for 1969.

The Consolidated Mining and Smelting Company have announced plans to install a plant to convert to steel, pig iron produced at Kimberley. Increases at existing operations and the nine mines under development are employing, or will employ, between 2,500 and 3,000 men. We in British Columbia are suffering from the lack of skilled miners, technicians, and engineers, and I feel sure that this topic will be discussed at this conference.

Oil and gas production in British Columbia, during the first six months of 1965, shows a marked improvement over the same period last year. Oil production increased 6½ per cent to 6,203,381 barrels, gas production rose 9½ per cent to 81,369,070,000 cubic feet, and corresponding increases were recorded for condensate, butane, propane, and sulphur extracted at the gas plants.

Due primarily to discovery of new oilfields and their development, drilling activity has increased significantly, according to reports covering the first seven months of the year. Total footage drilled is up 48 per cent to 620,212 feet, and development wells have increased by 57 per cent and outpost wells are 104 per cent greater than during the same period last year. Sixty-three oil wells were completed to the end of July, representing an increase of 230 per cent. Four hundred and forty-eight oil wells and 509 gas wells are now capable of producing. One hundred and forty-three well locations were approved to the end of July, as compared with 81 during the same period last year. The total of 34,658,419 acres of proved and potential oil and gas lands are under permit, lease, or drilling reservation as of July 31, of which 19,000,000 are within the rapidly developing Peace River area and the balance is principally offshore acreage. The Shell Oil Company announced recently their intention to commence a drilling programme offshore next year. British Columbia's stand is firm that this offshore acreage is within our jurisdiction, and we mean to maintain control over it, and we will continue to issue permits and administer them.

You can see from this résumé that British Columbia has an exciting future in the mining and petroleum industries.

I would now like Mr. G. A. Gordon, the president of the Mining Association of British Columbia, to introduce the keynote speaker of the conference.

Mr. Gordon introduced Mr. W. S. Kirkpatrick, president of The Consolidated Mining and Smelting Company of Canada, Limited, who addressed the meeting as follows:—

FACTORS IN THE FUTURE PROSPERITY OF CANADA'S MINERAL INDUSTRY

May I first say how much I appreciate the honour of addressing this 22nd Annual Conference of Provincial Ministers of Mines.

In accepting the invitation to speak, it so happens I occupy two positions deeply involved in our mineral industry—president of the Mining Association of Canada (formerly the Canadian Metal Mining Association), whose member companies represent more than 95 per cent of Canada's mining output, and president of The Consolidated Mining and Smelting Company of Canada, Limited, with which company I have spent all my working life. I speak from the background of a company whose beginnings are based in mines that were in production before the turn of the century. Therefore, although I am not a mining man by profession, and make no claim to great authority on the mineral industry, I do at least speak with feeling. There is no doubt in my mind that it is an industry that can and will become much greater in the years ahead, assuming there is no deterioration in the favourable conditions provided heretofore by the Federal and Provincial Governments. The very fact that those assembled are here today augurs well, I think, for the future.

Although it is hardly necessary when speaking to this group, I would like to recall for you a few salient facts that clearly demonstrate the significance of the mineral industry in any appraisal of Canada's economic welfare.

The gross value of Canada's mineral production has increased from about $900 million in 1949, the first year to include Newfoundland, to nearly $3½ billion in 1964. This represents an average annual rate of increase of over 9 per cent, compounded, for the 15-year period, which is over double the average growth rate for Canadian industry as a whole. Of the total mineral production, metallics account for more than half; fuels, including gas and oil, constitute about one-third; and structural and non-metallics the balance. Currently, mineral production constitutes over 7 per cent of our Gross National Product, and over 60 per cent of this total output must be sold in foreign markets, and this proportion is rising as the industry continues to outstrip our general domestic growth rate.

As we are continually told, the standard of living of Canadians is more dependent on our success in exporting our products than that of almost any other of the highly industrialized countries of the world. On a *per capita* basis, we are one of the greatest trading nations, and our export trade amounts to about 20 per cent of our Gross National Product, compared with 19 per cent for the United Kingdom and only 5.2 per cent for the United States. In this context, the mineral industry takes on great significance in its contribution to our over-all economic activity, because it accounts for nearly one-third of Canada's total export trade. For many years, exports of metals and mineral products have shown strong and consistent growth, and for the last seven years have led all product groups, including both forest and agricultural products.

Another important consideration is employment. About 130,000 people are employed in the exploration, mining, processing, and smelting operations of the industry, and work is presently available for several thousand more if men with the necessary qualifications can be found and directed into the industry.

This direct employment, as that in other primary industry, is relatively small. However, through its demands on the secondary and service industries, the income generated by our big,

efficient, and highly productive primary industries has a multiple effect as it flows through our economy, and indirectly is a major, if not the greatest, single source of demand for labour in Canada. Thus, in the case of the mineral industry, work is provided directly and indirectly for about seven times the figure quoted earlier, or about 13 per cent of Canada's total working labour force.

From the foregoing facts, it is clear that the well-being of our mineral industry is of prime importance to the general welfare of this country. In speaking to you today, I therefore wish to emphasize some factors that should not be overlooked in our pride in past achievements and our optimistic assumption of an even greater future.

Of course, in final analysis, the indisputable fact responsible for the growth and success of Canada's mineral industry is because the mineral deposits are here. Nevertheless, the position of pre-eminence enjoyed today by this industry is equally dependent on another fact—namely, that the vast funds of risk capital required for exploration and development were attracted by the rewards and security available to both domestic and foreign interests without discrimination.

Mining, as we are so fond of saying, is a risky business; in fact, some people say that apart from the very few really great mines and oil discoveries, more goes into the ground than is ever taken out. Be that as it may, if there is any contribution that this Mines Ministers' Conference can make as it meets annually with those directly concerned with the viability of the industry, it is dedication to maintain and improve the atmosphere that has led men and money to accept the risks in the hope of gaining the rewards that are possible in Canada's mineral industry today.

It must be remembered that mines, as viable economic operations, are not just found; they must also be made. Mineral deposits may be found, but they only become mines after investing the great amounts of capital required for plants to produce saleable products. And to be economically viable, it is necessary to find or develop markets of sufficient size and continuity to absorb the output at prices that will yield an adequate return on the investment.

In the early fifties, it seemed all we had to do was to produce and consumers would be at our door, ready to buy pretty well whatever we could produce, and at our price. This is certainly not true today.

For one thing, other nations anxious to become self-sufficient, and to hasten industrialization, and needing to conserve foreign exchange, are vigorously pressing development of their own mineral resources. Not only will they endeavour to supply domestic needs, but they will be reaching out into markets in other countries.

In other words, we must never overlook the fact that Canada is not the only country blessed with natural resources. There are already known to be mineral deposits with immense reserves in various parts of Africa, South America, and Asia that only await suitable political and economic conditions for their development. There are also a number of countries which formerly had a flourishing mineral industry, based on early surface discoveries; but as economic development progressed, it became increasingly costly to find and develop new orebodies. As a consequence, the contribution of the mineral industry to the economy of these countries gradually declined. This was not because of a lack of potential ore reserves, but as exploration and production became more difficult and costly, capital was diverted to other industries which offered more attractive prospects than mining. This situation has recently been recognized in several European countries, and governments are changing their regulations and tax laws to encourage mining. Ireland recently revised its mining code and, in consequence, is currently experiencing a successful exploration boom. In Greece, Portugal, and Spain similar changes

are in progress. All this will add up to increasing production of mineral products and keener competition for Canada.

Now I want to make clear that I am not suggesting that the world has no need for vast quantities of mineral products, but, under any given conditions, there is a limit to markets. This is shown by the fact that Canada's known reserves of coal, oil, gas, iron ore, and potash could support production at rates far beyond present plans if the output could be sold at a profit.

A primary consideration is, of course, the relationship between cost and price.

As I have already remarked, over 60 per cent of our mineral output must be exported, and in spite of development in domestic markets, we must expect that as the industry expands this proportion will tend to increase. The Canadian producer who sells in export markets has to sell at prices determined by international competition while still remaining financially healthy himself. A major problem of the future will be to avoid pricing ourselves out of world markets.

Canada is already one of the highest-cost economies in the world, and there is currently a marked tendency for wages to increase more rapidly than productivity. Consequently, costs are rising, yet we must keep ourselves competitive and profitable, or lose our ability to sell. In short, now is the time for government, labour, and industry to co-operate in planning to meet the intensifying competition that lies ahead.

Another key factor in exporting is the availability of foreign exchange. I recently travelled through the Far East, and my most significant impression there was the vast potential market for Canadian exports which the underdeveloped countries represent. But how do we sell to a customer who has no money?

Gifts, loans, and credit may be temporary expedients, but what the customer really needs is an independent source of income. This requires that these countries increase production and expand trade.

Canada currently trades with more than 100 countries and, except for the United States, usually has a favourable balance with almost all of them. We sell to each of these other countries more than they buy from us, and we naturally try to increase our sales still further. But we must recognize that we, in turn, have to accept their exports.

A further point is that our exports must be in a form acceptable to the purchasers.

From time to time it has been suggested that the export of raw materials should be prohibited to force processing in Canada and thus make jobs. They say we are exporting jobs that should be kept for Canadians. The idea was voiced in the case of iron ore, and is being repeated in regard to concentrates of other metals and similar materials.

I agree we should endeavour to export our mineral resources at the highest possible stage of manufacture, but other countries are just as anxious to employ their people as we. Therefore, they will endeavour to import in the rawest state possible for processing in their own countries. Know-how and technical knowledge can be obtained. The only situation that will stop them and permit countries like Canada to induce them to take refined metals and finished goods is if raw materials are not available to them. The supply of minerals and concentrates is increasing, and countries knowing this are building and expanding smelters. We cannot withhold concentrate supply for these smelters and force them to buy finished metals, because they can and will buy concentrates elsewhere than Canada if they cannot produce themselves.

What is the answer for mineral-producing countries like Canada? We must be ready to export at lower stages of manufacture where necessary, but, at the same time, we must use our assured supply of raw materials to good advantage by participating in the industrial development plans of importing countries. Such Canadian participation in foreign smelting and processing

operations would assist in ensuring captive markets and better returns on our raw-material exports. It also opens up the possibility of making package deals whereby they will agree to accept part of their needs as finished metal from us.

Recognizing the situation, my own company is sharing in building a zinc smelter in India. We have undertaken to supply concentrates for a joint lead smelter in Japan, and we are participating in exploration in a number of other countries hoping in due course to engage in mining. Other Canadian mining companies have taken similar action in various parts of the world.

These basic facts are no doubt well known to all of us here today, and I am sure that what brings us together at this conference is our common desire to promote the sound development of Canada's mineral resources for the well-being of our nation. I believe that although government and business people approach the subject from somewhat different directions, we all want efficient and economically sound development, and I believe that we shall succeed if we face up to the problems of maintaining the industry's competitive ability, recognizing each other's responsibilities, and working together towards the common goal.

May I remind you how deeply government is involved in the mining industry, and how significant government action can be in helping or hindering its progress. It would, in fact, not be inappropriate to say that government is the senior partner with shareholders and employees in the fortunes of resource companies like Cominco. This will be clear from a brief consideration of financial matters.

With the money available after payment of all operating costs, a company still has obligations to government for direct taxes, to shareholders for a return on their investment, and to the corporation itself to maintain it in an economically sound condition. This last is partcularly important in mining, where we are dealing with a wasting asset.

Using the last seven years of Cominco's experience as an example, we have had average gross earnings of about $50 million, which have been divided approximately equally three ways. One-third has gone to government for direct mining and income taxes, one-third has been reinvested in the business, and one-third has been distributed as dividends to the shareholders. On the basis of total shareholders' equity, dividends have averaged through the period just over 9 per cent on the money invested.

Note that governments have received the same amount as paid in dividends to owners, and yet they have no investment *per se*. In addition, they received indirect taxes on sales and purchases that may well equal or exceed this amount. Further, the employee pays a substantial part of his wages in taxes, and the shareholder pays income taxes on his dividends. In other words, government collectively is the biggest beneficiary from the profits of a corporation such as Cominco. Conversely, government will be the major loser if Canada's mineral resources are not brought to profitable development through lack of incentive or high production cost.

The return of 9 per cent as in Cominco's recent experience cannot be considered excessive, in comparison with returns on bonds and other low-risk investments. Further, Cominco is one of the more prosperous companies, so our return is appreciably higher than the average for the mining industry. It must not be forgotten that there are many small mines operating on a very narrow margin of profit, to say nothing of the relatively large proportion of ventures which never reach the production stage, or for various reasons never succeed in making any profit. Actually the average return, after taxes, on invested capital in the industry is only of the order of 6.2 per cent, compared with 10.3 per cent for agriculture, 14.8 per cent for construction, and 8.2 per cent for manufacturing. In the face of these facts, can anyone say that the rewards of mining are disproportionate to the risk?

There is no doubt that the special tax provisions in effect for the mining industry have played an important role in encouraging its growth in Canada, and their significance can be considered effective in two ways. First, they have given mining equitable taxation, in the light of its particular nature and hazards. Second, a positive incentive has been provided to overcome, in part, the highly speculative nature of exploration and the continuing uncertainties encountered even after bringing a mine into production. Experience has shown that underground development of marginal properties not uncommonly leads to discoveries of major orebodies. The incentive provisions now in effect have played an important part in deciding to bring into production properties which, from information available at the outset, appeared only marginally attractive.

Let me emphasize again. A basic reason that our country today has a flourishing mining industry is because of intelligent tax provisions arranged by past governments. It may be that other industries deserve their own special incentives, but to take away from the mining industry as a supposed means of benefiting other industries would be a negative approach. If this were done, I have no hesitation in saying that the rate of prospecting and exploration in Canada will be drastically curtailed. Our mining industry would be on the wane, with consequences harmful to the whole economy.

Tax laws have constituted only part of the political climate which in Canada has been favourable to the expansion of the mining industry. Other important factors which we expect will be continued are the good administration; the provision of services such as geological surveys, statistical records, access roads and other aids in transportation; also, as needed, assistance in provision of power, in community development, and in research projects.

Another favourable condition has been the freedom given to industry to develop in its own way, without interference by government, except to the extent of reasonable laws and regulations. In other countries, mining has been prevented or hindered in its progress by the constant threat of government interference and expropriation. I believe I can speak for the whole industry when I say that it is neither necessary nor desirable for governments to become involved in actual exploration or mining or in their direct financial support. Once this sort of thing is begun, there is a tendency for subsequent governments to extend it and become more and more deeply involved in all phases of the industry. Gradually, private enterprise, which has been so successful in developing our industry, will withdraw in the face of inequitable competition from non-tax-paying bodies. The case is clear enough on the record that, given a favourable climate, it is in the long run much more efficient if private initiative and private capital undertake the high-risk business of exploration and mine development, including production and marketing of products.

In the letter of invitation to address you today, the theme of " Canadian Unity " was stressed, and I could not but think that this conference is itself a remarkable achievement in that connection. While various interprovincial conferences are held from time to time, I have not been able to find another instance that equals this—namely, that every year since 1945 there has been a conference of this kind. Here all the Provincial Ministers of Mines meet with representatives of the Federal Government and the mining industry to discuss matters of common interest and make united recommendations for the resolution of various problems.

The record, I believe, speaks highly for the basic unity of mining interests, both between different geographical areas and also between government and industry. Mineral deposits do not respect political boundaries, and mining companies cannot afford to be local or restricted in outlook. Perhaps more than those of any other industry, mining men tend to think of Canada as a whole, from Atlantic to Pacific and north to the Arctic. Further, there is a long-established tradition in the Canadian mining industry to encourage free exchange of technical knowledge and

experience. This has doubtless contributed significantly to the growth and vigour of the industry and its present prosperity.

If this sort of co-operation is maintained, if government and business representatives continue to meet and study industry problems together, if recognizing each other's responsibilities we work together toward a common goal, there is little to fear for the future of Canada's mineral industry. And if other interests could follow the pattern thus established for mining, there would seem to be little reason to fear for Canadian unity.

Reply to the Brief Submitted to the Government of Canada Following the Twenty-first Annual Conference of the Provincial Ministers of Mines

To the Provincial Ministers of Mines:

I wish to take this opportunity to thank you for the brief, presented to the Government of Canada, resulting from the deliberations of your Twenty-first Annual Conference. The resolutions in your brief received full and careful consideration from the various departments concerned, and the views of the Government are incorporated in the following comments on specific items of your presentation. My predecessor, the Honourable William M. Benidickson, was the responsible Minister at the time of the last conference, and when you presented your brief in Ottawa on May 3rd of this year, and I am indebted to him for the substance of this reply.

Problems Relating to Mining Operations

Item 1: Proposed Amendment to Explosives Act, Ammonium Nitrate and Fuel Oil Order

It is realized that in many instances it is advantageous for a mine operator to be able to store assembled and blended AN/FO for short periods, and it is my understanding this can be worked out under existing regulations, provided the operator is able to comply with Provincial and Federal requirements.

From the point of view of the *Explosives Act,* there are four basic requirements which must be met before storage of assembled and blended AN/FO may be permitted:—

(1) The method of assembling and blending must be approved.
(2) The packages must be adequate to prevent the escape of any oil or blended product.
(3) The package must be marked to properly identify the contents; i.e., AN/FO Explosive Class 2.
(4) The storage building must conform to the minimum standards of H.E. magazines.

On the basis of these requirements, we will consider an application from a mine operator provided the proposal also has Provincial approval.

I am confident a satisfactory arrangement to permit short-term storage of blended AN/FO can be worked out through our co-operative efforts, and my Explosives Division is prepared to assist in this regard.

Item 2: Pollution of Streams and Lakes by Mine Waters

The Department of Mines and Technical Surveys has for some time recognized the growing problem of water pollution by mining operations in various areas of Canada, the need for more uniform control by Provinces of such pollution, and the urgency for research into methods of preventing pollution.

In co-operation with officials of Provincial Governments, mining companies, and the Department of Fisheries, my Department has agreed to investigate present pollution by base-metal mining in Eastern Canada and to carry out long-term research on preventive measures. Our Mines Branch has been monitoring mine waste waters and adjacent stream waters in this region for some time. Preliminary work is also under way on the effect of coal-mining on stream waters in the eastern Rockies.

Action is now being taken to expedite work on all phases of this problem. Two regional laboratories—one in the east and one in the west—are planned to facilitate the necessary field and analytical work. A site for a regional laboratory in the Maritime area is now being considered, and additional staff will be recruited in the near future. In the meantime, temporary quarters will be occupied at the Bedford Institute of Oceanography, Dartmouth, Nova Scotia. It is expected that studies on this problem will be well under way during the 1965–66 fiscal year.

Geology, Geophysics, and Prospecting

Item 3: Reprinting of Booklet of Geological Symbols

The booklet to which reference is made in your brief was not reprinted when the supply was exhausted. It was found that a publication of this nature was too inflexible to serve our constantly changing needs, which reflect the repeated changes in the nature and scope of our work.

Instead, a list of symbols was prepared to combine the needs of our geologists and encourage simplicity in cartography, and it was included in our booklet "Guide for the Preparation of Geological Maps and Reports." This Guide is revised periodically and is distributed free to the Provincial Departments of Mines and the geological departments of Canadian universities. Indeed, it is used by some as a textbook, and as a standard reference source by many mining and oil companies.

The original list of symbols was selected by an *ad hoc* committee after consulting many references, both national and international, and the final result circulated to the Provincial departments for comment. Additions since then have been made with reference to existing practices throughout the world.

Thus you will see that a list of symbols commonly used by the Geological Survey is published periodically, the last edition in 1961. This list and the Guide it accompanies has been reprinted, with minor revisions and an addenda, and is now available for distribution. Copies of the Geological Survey's new booklet "Standards and Specifications for Geological Cartography" are also now available on request.

Royalties, Taxation, and Tariffs

Item 4: Section 701 of Income Tax Regulations, Section 11 (i) (p) of Income Tax Act

Your request that section 701 of the Income Tax Regulations be eliminated concerns the situation under which the proportion of taxes on mining income levied by the Provinces is not always allowed in full as a deduction from income for purposes of the Federal *Income Tax Act*. I am aware of the representations of the members of the mining industry urging changes in the application of the present rules governing the allowance of the Provincial mining taxes.

As you are aware, the whole of Federal-Provincial fiscal relations, of which this is part, are under study by the Tax Structure Committee of the Federal-Provincial Conference. The Minister of Finance and Chairman of the Tax Structure Committee reported to the July, 1965, Federal-Provincial Conference that the Committee hopes to submit its report to the conference next spring;

i.e., prior to the negotiation of the next quinquennial fiscal arrangements with the Provinces. Under these circumstances it would be appropriate for the Provincial Governments to submit their views regarding section 701 of the Income Tax Regulations to the Tax Structure Committee or to the Federal-Provincial Continuing Committee on Economic and Fiscal Matters (the committee of officials serving the Tax Structure Committee) through their representatives on these committees.

Coal

Item 5: Coal Subvention Policy

On behalf of the Government, I would like to say that your expression of gratitude for the assistance and the services given to the Canadian coal industry by the Federal Government is much appreciated.

I advised you in Banff that assurance of the continuity of subvention assistance would be forthcoming. I am glad to report that on December 2, 1964, formal approval was given by Parliament to the provision of annual payments not exceeding $18,000,000 annually for five years commencing April 1, 1965, to be made in connection with the movements of coal in accord with such regulations as may be prescribed by the Governor in Council.

You can therefore count on subvention assistance for that period, while, as I have noted before, further study will be given to the long-term future of the industry and of the people and communities dependent upon that industry.

I am pleased to have had this opportunity to convey to Provincial Mines Ministers the Federal Government's views on the matters dealt with in the Brief arising from your Twenty-first Annual Conference. The Provincial Mines Ministers' Conference has proved to be of great value over the years as a forum for the interchange of information and viewpoints on public policy. I wish to convey my best wishes for a productive Twenty-second Annual Conference and hope that this conference may be as successful as those in the past in making an important contribution to the field of mineral industry public administration.

Respectfully submitted.

J. Watson MacNaught,
Minister of Mines and Technical Surveys.

At a luncheon on September 13th, Prof. P. M. Dranchuk, Department of Chemical and Petroleum Engineering, University of Alberta, presented the following address:—

THE POPULATION EXPLOSION AND THE PROBLEM PROBLEM

I am both pleased and highly honoured to have the opportunity of speaking to you on this occasion. Before I present my talk, however, I must warn you that my topic differs somewhat from that listed in your programme. You are no doubt familiar with the vicious rumour that amongst university professors it is an age-old custom when setting examinations to use the same old problem but to change the answers. Since I consider this meeting to be extremely important, I have decided to do something completely different. I've decided to keep the answer but to change the problem.

Let me take but a moment to explain how this all happened. Last spring I presented a paper on the shortage of engineers, to the annual meeting of the C.I.M. in Toronto. Shortly thereafter I received a letter from your programme chairman asking me if I would attend your conference, and in particular if I would speak to you on some aspect of mineral industries education. Since

the topic was still fresh on my mind and since I had fond memories of the Malahat Drive and the fine city of Victoria, I accepted the invitation without hesitation. It wasn't until some time later when I first tried to set the talk to paper that I realized that the present state of mineral industries education is such that there isn't much about it which one would care to hear immediately after enjoying a fine meal. I tried various approaches to the suggested topic, but every time I came to the same conclusion. Anything I might say would be controversial. This of course just wouldn't do, since the success of both the programme chairman and the speaker hinges upon whether or not the speaker confines himself to the domain of what John Kenneth Galbraith calls the conventional wisdom; that is, Galbraith infers that a speaker's only hope of success lies in telling his listeners that which they wish to hear.

Therefore, with due regard to Galbraith's wisdom, your comfort, and Dr. Sargent's kindness, I have chosen to speak to you briefly on the topic " The Population Explosion and the Problem Problem."

I see from the various expressions before me that your reaction is like that of the young lady who, upon opening her present, exclaimed, " Just what I've always wanted, what is it? " Therefore, let me elucidate my topic.

I am sure that you've all heard of the population explosion. Since it has been learned that the world population is increasing at an increasing rate, it has been stated that, contrary to popular opinion, the world is not going to the dogs but to the people. In fact, it is feared that in due course it will be overrun by them. This, it is predicted, will have very serious side effects. But before we examine the implications of the population explosion, let us turn to the other part of the topic.

The Problem Problem I'm certain is somewhat less familiar to you. For those of you who have never heard of it, let me explain that it is not a problem which is considered by a sub-sub-committee. It is the title of a bit of prose written by Meg Greenfield for the February 25th issue of *The Reporter*. This article states that the problem-identification boom, which started in the late fifties, may soon be offset by a solution explosion. The prediction is that the lag in the gap between the explosion and the boom is pointing the U.S.A. towards an unprecedented problem drain.

In other words, this article observes that in the late fifties it became popular to identify problems. This is not new to you, for you are all too familiar with the rash of Royal Commissions since that time. But recently computers have become so fast that in the future before an engineer can ask where is my slide rule, a computer will have solved the problem, printed the answer, and shut off its own power supply. This then poses the problem of being faced with a problem shortage.

This is such an interesting article that I should like to read you a portion of it. I quote:—

" The President's Council of Economic Advisers calculates that no fewer than four million new jobs have been created since 1957 as a result of the problem boom. As an example, staff aides point to the migrant-worker issue which was uncovered by social scientists in 1958 and again in 1961. At its peak period, the migrant-worker problem provided almost continuous full employment in the television documentary industry alone, and this, taken together with the television commercial input, columns and editorials printed, printing and production fees, airlines' income, and related janitorial and custodial services, is thought to have been a major factor in the nation's unexpectedly swift recovery from the recession of 1958.

" In the view of many economists, the most important aspect of the migrant-worker problem was that the only group of wage-earners who did not seem to benefit from the activity it generated were the migrant workers themselves. Since 1957, in fact, they have declined in number by only 11 per cent and continue to function outside the coverage of minimum-wage legislation. While the

meaning of these facts is still not clear, one school of economists has interpreted them as evidence of the existence of a fuss-slump cycle known to specialists in the field as the dropout effect. If they are correct in this assessment, the typical public problem has a marketability life span of approximately 18 months before it drops out, and since solution lead time is known to require at least 48 months, these economists argue that any fears the nation might have that its problems are going to be solved prematurely are unfounded. Over the short term, at any rate, they believe that they have discerned a self-righting mechanism at work in such cases; as they see it, there is little reason to question the health of a socio-economic system that can derive 13.9 per cent of its total output of goods and services from public efforts to solve a problem, while leaving the problem itself 89 per cent intact."

Although this is all very interesting, the question is what has all this to do with the mineral industries? Let us examine the situation in more detail.

The question of whether or not the rate of population growth will ever reach a point where it may be termed an explosion seems rather academic at this time, so let us not become involved with it. However, conservative predictions have it that in the next 50 years the world population will double. It is also predicted that during this same period of time we shall witness the application of ever-increasing pressure for the attainment of an increased standard of living, especially by the people of the so-called underdeveloped nations.

These two predictions are extremely important to the mineral industries. Their significance can be readily appreciated when it is realized that essentially all of the serious studies on energy and mineral resources agree on one point—namely, that if the world population or its standard of living, or both, are to increase, there must at least be an adequate supply of fresh water, energy, and minerals. That such a supply is assured is by no means obvious. In fact, one study suggests that if at this moment the standard of living of all the nations were to be raised to that of the United States, the only ore remaining in the upper 2 miles of the earth's crust which would be mineable by today's standards and economics would be aluminum!

This suggests that from an international viewpoint the mineral industries have still a leading role to play. If, however, we look at the situation from a purely national point of view, we see that a very significant portion of Canada's Gross National Product is due to its mineral industries. Since our nation has been abundantly endowed with water, mineral, and energy resources, these industries shall have ample opportunity to increase, leave alone maintain their contribution to the national economy.

The burning question is, will the mineral industries be able to meet this challenge? In view of the fact that in recent years these industries have experienced increasing difficulty in the recruitment and retention of both skilled and technical personnel, it must be concluded that unless they can attack this problem in some more effective fashion, the challenge shall have to go unanswered.

Many maintain that the problem isn't all that bad, and besides we are working on it. But the fact is that, despite or because of our efforts, some of the oldest schools of mineral engineering are closing their doors. This is a matter of necessity, since a school without students is no school at all. However, let us not be misled by the many educators and industry members alike who suggest this to be a good thing. They reason that mineral engineering is outdated and that its demise will force industry to employ men with a more general background. This is foolish wisdom, since it suggests to a man who has just failed to shoot a sitting duck that he go out and catch a wild goose.

We could go on to further examine the problem and its currently proposed solution, but little more is to be gained by so doing at this point. For no matter how we look at it, we must

eventually conclude that this problem is unique in the annals of modern man. It in no way contributes to the Problem Problem. For although each of our piecemeal attacks has been successful, the original problem has remained completely intact.

This situation has developed for two main reasons. First, we have chosen to attack the problem in a trial-and-error fashion, and, secondly, the solution is sought by various volunteer committees.

Although I don't wish to belittle the efforts of my friends and colleagues who have attacked the problem with great vigour, I must observe that a volunteer committee is somewhat like a non-profit corporation. It is faced by the question of how to show a larger non-profit in the following year. The answer is obvious, the committee gets bigger and its efforts more diverse, but the main problem must remain since its solution spells the committee's doom. Committee members, however, are seldom aware of this.

With regard to the trial-and-error approach, my feeling is that, although it may eventually succeed, we can afford neither the time required nor the risk involved.

In closing I would suggest that the problem be attacked on a rigorous basis. This could be done by establishing a full-time salaried research group which would

(1) identify the problem completely;
(2) delineate its possible causes in their entirety, no matter how seemingly insignificant the contributory cause may be;
(3) design a solution based upon the problem and its causes;
(4) design a means of implementing the solution.

Since the problem is a national one, and since the first three parts of the proposed attack would best be handled by government rather than industry, I suggest that if we are to start, the place is here and the time is now.

COMMITTEE REPORTS, RECOMMENDATIONS AND DECISIONS OF THE MINISTERS

COMMITTEE No. 1

PROBLEMS RELATING TO MINING OPERATIONS

Co-Chairmen: Mr. F. Gover and Mr. D. P. Douglass

1. Report on non-destructive testing of mine hoist ropes and equipment.

In view of the fact that active research is being carried on by some Provinces, it was recommended the discussion be resumed at the 1966 conference.

2. The capping of ropes and design of conveyance attachments (cappels and sockets) —the metals used for socketing and capping.

Recommended for continuing study and for the 1966 conference agenda.

3. Use of ammonium nitrate as an underground blasting agent.

Recommended for inclusion in the 1966 conference agenda.

4. Report *re* on-site storage of ammonium nitrate-fuel oil mixtures.

Recommended that further study unnecessary as there does not appear to be any problem involved.

5. Standardization of explosive and blasting-agent magazines.

Recommended that Ministers might request the Minister of Mines and Technical Surveys to authorize the updating of the pamphlet entitled " Storage of Explosives," and that the revised edition include a particular reference to storage of AN/FO and slurry-type blasting agents and the like.

6. Effects of noise on mine workers' health.

Recommended subject be retained on agenda for future discussion.

7. Report of committee set up under Chief Inspectors to study reclamation of mining lands.

Report received for study, and it was recommended to Ministers that the subject be removed from the agenda until such time as it may be requested by some Province that it be reviewed.

8. Report *re* suggested Canada-wide mine-rescue competition.

The chairman of the sub-committee established in 1964 to study this matter reported as follows:—

1. *Background.*—The idea of an annual Canada-wide mine-rescue competition has been broached at past Mine Ministers' Conferences but has received little support, as it would appear that the effort needed to put on an annual event would not be balanced by a worth-while increased stimulus or recognition of mine-rescue work. However, in 1964 No. 1 Committee was asked to consider the proposal of a mine-

rescue competition for just the Centennial Year of 1967. A sub-committee of Chief Inspectors was set up, with Mr. J. W. Peck as chairman.

2. *Progress.*—Considerable information was collected on the methods now used to run competitions in each Province. The proposal of a Canada-wide competition was discussed at an interim meeting held in Toronto, March 29, 1965.

3. *Summary.*—(1) Provincial competitions are now held in British Columbia, Ontario, Quebec, Northwest Territories, and Manitoba. Alberta has held such competitions, and interest is shown by Nova Scotia, Newfoundland, Saskatchewan, and New Brunswick. The methods of judging these competitions vary. British Columbia and Northwest Territories bring the competitors to a central place; the other Provinces move the judges to each local site.

(2) The only past precedent for interprovincial competitions is in the period 1916–23, when competitions were held between British Columbia and Alberta. For similarity on a Federal basis, the U.S. Bureau of Mines has been holding mine-rescue and first-aid competitions on a regular two-year interval.

(3) There are differences in the training programmes in each Province.

(4) There are differences in the judging of teams in competitions in the Provinces where such competitions are held.

4. *Costs of a Canada-wide Competition.*—These are estimated as follows:—

Travelling and living expenses for 10 teams of eight (six members plus coach, plus representative)	$20,000
Local expenses for mine erection, banquet, etc.	1,500
Co-ordinators' expenses	3,500
Total	$25,000

(No estimate is included of lost wages of team members or co-ordinators' salary.)

5. *Conclusion.*—The sub-committee cannot proceed further without direction. It would be impractical and time-consuming to endeavour to standardize the rules for a competition by the criss-crossing of correspondence from the various departments of mines. The agreed-on rules are needed by early 1966 in order that Provincial competitions can train with these rules for a year in advance of the proposed Canada-wide competition in 1967. It is therefore suggested that the appointment of a full- or part-time co-ordinator is a necessity before proceeding further, and that the Ministers be advised of this as well as the amount of funds required. (J. W. Peck, Chairman.)

The report was recommended to the Ministers for acceptance, noting, however, that not all Provinces are agreed that the suggestion has, as yet, the necessary virtue to warrant the expenditure of money and organization that would be necessary to carry it out.

9. The pollution of streams and lakes by mine waters.

The Committee noted the reply of the Honourable the Minister of Mines and Technical Surveys to the representation which was made to him last year on the subject of pollution of streams and lakes by mine waters, and wishes to register his appreciation of the efforts now being carried out by the various Federal departments involved in investigating this matter.

DECISION OF THE MINISTERS

Items 1 to 7, inclusive, were approved. Item 8 was noted in the minutes and for printing in the proceedings (*see* page 32).

Item 9 was noted and will be carried in the agenda for the 1966 conference.

COMMITTEE No. 2

PROBLEMS RELATING TO EXPLORATION AND DEVELOPMENT

Chairman: Mr. P. E. Auger Secretary: Mr. R. D. McDonald

1. Résumé of new legislation.

British Columbia had a change in the *Park Act,* resulting in different types of control within the parks.

Manitoba had several changes, especially regarding the number of claims to be staked with one licence; also there are other changes connected with assessment regulations.

Saskatchewan had many basic changes, mainly staking is no longer required in surveyed areas, and stakers' licences are no longer issued. Other changes involve changes in size of claims, blocks, and permit areas, assessment requirements, and mode of staking.

Ontario: There are minor changes involving staking requirements and a clarification on the method of attaching the tags. There is also a simplification of the recording and transferring forms.

Quebec: There is a new Mining Act, which will be in force on January 1, 1966. The highlights are replacing mining concessions by mining leases, increasing of claim areas from 400 acres to 1,200 acres per permit, no further staking by proxy, provision for expropriation of surface rights.

Nova Scotia: Minor changes in the regulation related to the holding of claims with the alternatives of assesment work or the payment of 50 cents an acre.

Newfoundland is presently drawing up regulations covering oil and gas.

2. Report from Provincial authorities *re* use of forms.

The forms that had been devised included financial statements. It was recommended that the forms should be restricted to items related to exploration and development. In connection with these remarks it was moved by Mr. J. F. Davis, seconded by Mr. K. J. Christie, that " The sub-committee of Committee No. 3 on mineral statistics should not concern itself with the collection of data on the kind and amount of exploration work done by mining and exploration companies."

3. Collection, storage, and retrieval of geological and other exploration data.

This item of the agenda was studied in conjunction with Committee No. 5. Committee No. 2 agrees with the aim of this project and looks forward with interest to the completion of the programme as outlined by Dr. Robinson.

4. Report *re* revision of Geological Survey of Canada booklet on standardization of geological symbols.

Dr. Yves Fortier, of the Geological Survey of Canada, deposited before the Committee No. 2 a revision of a booklet " Geological Symbols."

5. Topographic maps.

It was reported by Dr. Yves Fortier

(*a*) that the Federal Government will publish all topographic maps with an overprint grid based on the metric grid system;

(*b*) that with regard to overprints on topographic maps and the location of data on them, no firm decision has been made regarding the use of latitude and longitude or the U.T.M. grid system.

6. Exclusion of land from mineral exploration.

The committee expresses the opinion that exclusion of land from mineral exploration caused by the establishment of new parks is due to the initiative of some Provincial Governments as well as the Government of Canada. The committee also deplores the fact that the various Provincial departments of mines and natural resources do not have a more influential voice in the decisions that are being made in the establishment of such parks.

In view of the above, it is recommended to the Ministers that a public relations programme be instituted for the purpose of demonstrating to the public that controlled prospecting and mining will not lower the æsthetic and recreational values of any area.

7. (*a*) Transportation for the mineral industry.

The committee did not comment on the subject.

(*b*) Communications for the mineral industry.

The committee feels that past action taken by Federal and Provincial authorities to build roads was improved and that further action along this line should be taken by the various authorities to promote mining development in Canada.

8. Other matters.

The subject matter of items 4 and 5 in the agenda of Committee No. 3 was brought up. After discussion it was moved by Mr. R. V. Scott, seconded by Dr. H. Sargent, that " Land titles, expropriation and surface rights are of great importance in exploration and development and that these are suitable topics for consideration by Committee No. 2 in the future."

DECISION OF THE MINISTERS

The items shown above were considered and noted.

COMMITTEE No. 3

ROYALTIES, TAXATION, AND TARIFFS

Joint Chairmen: Dr. J. P. Nowlan and Dr. H. Sargent

1. Review on mineral statistics reporting.

A report of the working committee formed by the Mines Ministers is attached as Appendix I.

The following resolution is recommended by Committee No. 3:—

" That a permanent sub-committee on mineral statistics be established to review all existing and future statistical requirements of joint interest, with particular reference to the need for the data requested, the elimination of duplication of inquiry and the simplification of forms, all in keeping with the over-all objectives of reducing the reporting burden of mining operators and of obtaining the most useful, uniform and co-ordinated statistics; and

" That the membership of the sub-committee consist of one representative from government and one representative from industry from each Province, and from the combined Yukon and

Northwest Territories, and a representative from each of the Dominion Bureau of Statistics and the Department of Mines and Technical Surveys be invited to serve on this committee; and

" That the sub-committee absorb and replace the conference of Provincial-Federal mining statisticians."

2. Uniform tax base.

Mr. B.C. Lee recommended to the Committee that a sub-committee be established to study the desirability of developing uniform allowances and disallowances under Mining Tax Acts throughout the several Provinces.

After a full discussion of the matter, a motion to this effect was defeated. In accordance with the reply by the Federal Government to item 4 of the Brief presented by the Provincial Ministers of Mines in May, 1965, the following resolution was adopted:—

" That the Mines Ministers be requested to submit their views through their respective representatives on the Federal-Provincial continuing committee on economic and fiscal matters relative to obtaining full allowances of Provincial mining taxes for Federal income-tax purposes."

3. Mines and minerals acquired and held by Canada within Provincial boundaries.

A report of the sub-committee appointed by the Mines Ministers in 1964 to gather statistical material from a sampling of the Provinces is attached as Appendix II.

This report is submitted as a synopsis of the situation in three Provinces only, and is intended to draw to the attention of the Mines Ministers the magnitude of the problem.

The committee recommends that the Mines Ministers inform their respective Governments of the extent of the erosion of the base on which Provincial taxes are levied.

No recommendation for further presentation to the Federal Government on this matter is made at this time.

It is drawn to the attention of the Mines Ministers that Manitoba has in one case at least an arrangement with the Federal Government which permits exploration for and exploitation of minerals.

4. Procedures.

The following resolution is recommended by Committee No. 3:—

" That the Mines Ministers consider the establishment of a standard procedure by the host Province whereby the Provinces which submit topics for the conference agenda be requested to include background information on the topic for circulation among the delegates prior to the conference."

APPENDIX I

REPORT TO COMMITTEE No. 3 OF THE SPECIAL SUB-COMMITTEE ON COLLECTION OF STATISTICS

Meeting held at 2 p.m., September 12th, in the Empress Hotel, Victoria, British Columbia.

In keeping with the programme of the Twenty-second Annual Conference, an advance sub-committee meeting was held at 2 p.m., September 12th. This, in effect, was a continuation of the last Federal-Provincial conference of mining statisticians held last June in Ottawa at the Dominion Bureau of Statistics. The meeting considered the following:—

1. Modifications to existing joint Federal-Provincial annual census of mines questionnaires.

There was a general agreement to adopt more simple, shorter reporting forms for the smaller operators in the metal, non-metal, and structural-materials industries. As a result, the Dominion

Bureau of Statistics will proceed with the development of such forms, and these will be implemented in the 1965 Census of Mines.

2. Proposed joint questionnaire on exploration and development expenditures.

At the June conference of Federal-Provincial mining statisticians, the Dominion Bureau of Statistics was asked to review the forms submitted by the special committee appointed at the last Mines Ministers' Conference. The purpose of this review was to arrive at a joint Federal-Provincial questionnaire incorporating the statistical requirements of the Federal and Provincial agencies concerned.

At the meeting the Dominion Bureau of Statistics submitted for discussion such a joint questionnaire, combining in one form questions on expenditures which now form part of three different questionnaires. At the same time Quebec also submitted for discussion a questionnaire covering both expenditures on exploration and development and on the type and kind of work undertaken. Since time did not permit full consideration of the proposed questionnaires, and since it was felt necessary to have more knowledge of the recommendations of Committee No. 2 in this area, it was decided to hold additional meetings before developing further the content and format of the joint expenditures questionnaire. To this end a meeting will be held Tuesday afternoon.

3. Formation of a continuing sub-committee on mineral statistics.

At the June conference of Federal-Provincial mining statisticians it was recommended that the Mines Ministers be requested to consider the formation of a permanent sub-committee on mineral statistics. This was further considered at the meeting, and the following resolution, proposed by Mr. J. T. Cawley, Deputy Minister of the Department of Mineral Resources of Saskatchewan, and seconded by Dr. Hartley Sargent, of the Department of Mines and Petroleum Resources of British Columbia, is submitted for your consideration:—

" That a permanent sub-committee on mineral statistics of Committee No. 3 be established to review all existing and future statistical requirements of joint interest, with particular reference to the need for the data requested, the elimination of duplication of inquiry, the simplification of forms; all in keeping with the over-all objectives of reducing the reporting burden of mining operators and of obtaining the most useful, uniform, and co-ordinated statistics."

APPENDIX II

INVENTORY OF MINERAL RIGHTS OF CANADA IN PRAIRIE PROVINCES

Sub-committee Report, September 1, 1965

		Acres	
1. Alberta:			
Soldier Settlement Board		48,552.57	
Department of National Defence		163.00	
Indian Affairs Branch		1,232.08	
Canada (no department specified)		38,595.57	
			88,533.22
2. Saskatchewan:			
Soldier Settlement Board		129,187.00	
National Defence:			
Dundurn Camp	26,379.00		
P.A. Rifle Range	720.00		
Burdick Rifle Range	625.00		
		27,724.00	

2. Saskatchewan—*Continued*

		Acres	
Historical sites:			
Fort Livingston	120.00		
Fish Creek	78.00		
		198.00	
R.C.M.P. Rifle Range		266.03	
Indian Affairs Branch		8,095.13	
Northern Affairs and National Resources		2,145.00	
P.F.R.A.:			
Hugonard Dam and Reservoir	52.21		
Weyburn Water Storage Project	437.80		
Pheasant Creek Reservoir	77.17		
		567.18	
Prince Albert Penitentiary Reserve		1,694.25	
Agriculture:			
Indian Head Experimental Farm	1,311.37		
Indian Head Nursery	477.00		
Saskatoon Elevator	47.00		
Moose Jaw Elevator	4.28		
Scott Experimental Farm	1,007.35		
Swift Current Experimental Farm	1,122.50		
Regina Experimental Farm	580.41		
		4,549.91	
Department of Transport		4,941.32	
			179,367.82
3. Manitoba:			
Northern Affairs and National Resources		116,080.00	
Department of Agriculture		2,596.50	
Department of National Defence		8,530.00	
Indian Affairs Branch (estimate)		1,000.00	
			128,206.50
Total for Prairie Provinces			396,107.54
National parks:			
Alberta (Banff, Elk Island, Jasper, Waterton Lakes, part of Wood Buffalo)			13,258,880
Saskatchewan (Prince Albert)			957,440
Manitoba (Riding Mountain)			734,720
Total, National Parks			14,951,040

It is evident from correspondence we have had with various departments of the Government of Canada that no single list of mineral rights owned by Canada exists; some departments have lists, others are working on them. There are instances where a department includes rights which cannot be reconciled with the land title's records. Because of these factors, the final total, when known, would be higher than our total of 396,107.54 acres.

DECISION OF THE MINISTERS

The recommendation in item 1 was approved, and Dr. J. P. Nowlan was appointed chairman of a continuing sub-committee. Items 2 and 4 were also approved, and item 3 was noted.

COMMITTEE No. 4

COAL

Chairman: Dr. J. P. Nowlan

1. It is agreed that the following resolution be presented to the Ministers of Mines for transmittal to the Government of Canada:—

" Whereas the Government of Canada has enacted legislation providing long-term subvention assistance to the coal industry of Canada; and

" Whereas this policy has proven over the current year to have provided major widespread over-all benefits in particular with regard to long-term planning:

" Therefore be it Resolved, That the Provincial Ministers of Mines here assembled be respectfully requested to transmit to the Government of Canada the continued thanks and grateful appreciation of the Canadian coal industry, including the services of the Dominion Coal Board, which is also sincerely appreciated and of very great value to this industry."

2. The Committee also discussed at some length the disposal of extended tax rebate to public utilities and decided to maintain a continuing interest in the matter.

DECISION OF THE MINISTERS

The resolution was approved and the report noted as a memorandum.

COMMITTEE No. 5

PETROLEUM AND NATURAL GAS

Co-Chairmen: Mr. H. H. Somerville and Mr. J. T. Cawley

The Committee met on June 11 and September 13, 1965, respectively, and the working sub-committees met on occasions during the year.

The Lands Sub-committee completed a model Act relating to the ownership of casing or tubing remaining in a well, entitled " The Model Casing and Tubing Property Act." The Lands Sub-committee also completed a model form of surface lease.

These models will be made available to government and industry representatives. During the ensuing year the Lands Sub-committee will undertake

(*a*) the completion of a model Act relating to exploration for underground gas storage;

(*b*) a comparative review of mechanic's lien legislation of the various Provinces relating to oil and gas;

(*c*) a model option to acquire an easement;

(*d*) amendments to the model unit agreement and the model unit operating agreement to make these models conform to present practices of the industry; and

(*e*) a study of recent Court decisions and other materials relating to the freehold oil and gas lease with the view to drafting a model form of oil and gas lease.

The Technical Sub-committee, through its working sub-committee, has completed Casing Salvage Rules. These have been referred to the Legal Sub-committee for final drafting for inclusion in the model Rules Governing the Drilling and Production of Oil and Gas Wells.

The Technical Sub-committee has no new projects assigned but will consider any project submitted during the coming year.

A Progress Report on Development of a National System for Storage and Retrieval of Geological Data in Canada was made to this Committee by Dr. S. C. Robinson, of the Geological Survey of Canada, on the invitation of your Committee. The report outlined the work undertaken by an *ad hoc* committee of the National Advisory Committee on Research in the Geological Sciences with respect to the development of a system for storage and retrieval of geological data for use by any organization in Canada that may wish to use it.

The Committee has adopted the universal well-location reference and unique well-identifier system proposed by the Central Well Data Committee of the Canadian Petroleum Association and has appointed an *ad hoc* committee to thoroughly study the system and to work out any special problems that the system may present.

The continuation of the Committee as a standing committee is recommended.

DECISION OF THE MINISTERS

The report was approved.

COMMITTEE No. 6

EDUCATION

Chairman: Mr. Stuart Anderson

The Committee forwarded to the Ministers a brief (*see* page 42) presented by the General Committee on Education of the Canadian Institute of Mining and Metallurgy in response to Resolution No. 3 of the Education Committee as adopted by the Ministers at the Twenty-first Conference.

The Committee recommended that a uniform survey covering the usage of personnel, plus personnel inflow and outflow, with the reasons for the latter, and comments on resultant shortages, if any, should be made Province by Province as soon as possible, and, further, that the idea of the concurrent conferences as proposed in the brief appears attractive to the Committee, and it recommends that a plan for such conferences be developed as quickly as possible, with the conferences themselves to take place after the results of the survey are available.

DECISION OF THE MINISTERS

The following resolution was approved:—

" That a uniform survey covering the usage of personnel, plus personnel inflow and outflow, with the reasons for the latter, and comments on resultant shortages, if any, should be made Province by Province as soon as possible, and, further, that Mr. Stuart Anderson, Deputy Minister of Mines of the Province of Manitoba, undertake to make the necessary arrangements for said survey."

The Ministers have also considered a further recommendation that each Province hold a concurrent one-day conference in each of the Provincial capitals, to which would be invited representatives of the mining industries, educational institutes, and pertinent associations in each Province to discuss the educational needs and requirements of the mining industry.

The Ministers, in taking under advisement the recommendation of the brief, find that there is some question as to the feasibility of being able to initiate such a project as conceived by the C.I.M. committee.

The Ministers, therefore, ask that the General Committee on Education of the C.I.M. undertake, through the Chairman of that Committee, to establish

(1) the general concurrence of each of the Provinces;

(2) the date upon which such a conference might be held.

In the event that such a survey is successfully completed, the Ministers would then consider the advisability of proceeding with the plan as conceived in the report.

BRIEF TO THE TWENTY-SECOND CONFERENCE OF THE PROVINCIAL MINISTERS OF MINES FROM THE GENERAL COMMITTEE ON EDUCATION, CANADIAN INSTITUTE OF MINING AND METALLURGY

Presented by Mr. R. D. Hindson, Chairman

Committee Members:

Mr. R. D. Hindson (Chairman), Department of Industry, Ottawa; Mr. W. Keith Buck (Vice-Chairman), Department of Mines and Technical Surveys; Mr. V. A. Haw (Secretary), Department of Mines and Technical Surveys; Prof. A. V. Corlett (Past Chairman), Professor Emeritus, Queens University; Mr. E. G. Tapp (Treasurer), Canadian Institute of Mining and Metallurgy; Prof. F. A. Forward, Privy Council Office, Ottawa; Mr. R. D. Parker, International Nickel Co. of Canada Ltd.; Prof. G. W. Govier, Oil and Gas Conservation Board; Mr. R. E. Barrett, Canadian Institute of Mining and Metallurgy; Dr. J. R. Bradfield, Noranda Mines Limited; Prof. Paul Riverin, Ecole Polytechnique, Montreal; Dr. G. M. Brownell, University of Manitoba; Mr. E. Futterer, Kerr-Addison Mines Limited; Dr. W. F. James, Consultant, Toronto; Prof. H. R. Rice, University of Toronto; Mr. M. A. Upham, Newmont Mining Corporation; Mr. V. C. Wansbrough, The Mining Association of Canada.

This is the third time that the General Committee on Education, C.I.M., has had the privilege of appearing before you. As Chairman of the General Committee on Education, I have had the honour on each of these occasions of speaking on their behalf. You have always received us most graciously and generously, and for this we are deeply appreciative. Because of your past generosity, one might think that we might be embarrassed to appear before you again today. Let me assure you however that this is not the case, for the suggestion that we have to submit to you today for your consideration is something which we believe will fire your imagination and result in one of the most effective education-oriented public relation programmes ever carried out on behalf of the mining industry of Canada. Gentlemen, this industry needs such a programme, and you are the only ones who can give it to them.

With the support received from you and others, the General Committee on Education has been very active over the past few years. We have worked hard and long in trying to see to it that the mining industry obtained the kind of people it needs in order to achieve its economic goals and meet the technological challenges they are faced with.

These activities, along with the time and effort it takes to answer correspondence, raise funds, attend meetings, etc., have taxed our Committee to the limit. The unfortunate thing is that we realize we are only scratching the surface because of the limited time and resources of our Committee compared with the magnitude and complexity of the problem. A much more powerful group than ours, with time and financial resources, is required to take on the job we are attempting to do: a group able and willing to undertake a much more dynamic programme; capable of capturing the imagination and interest of all concerned and to give the educational needs of the mining industry the kind of attention and publicity it must have. Gentlemen, we believe you are

that group. Indeed, we believe you are the only group who have both the knowledge of and interest in the Canadian mining industry and the problems they are faced with yet capable of overstepping the fragmented nature and division of the industry, our educational institutions, and even our country. Collectively you represent the mining industry in all of Canada, and collectively you can do much to help the mining industry obtain the kind and number of people they need to meet the challenges ahead.

We have conceived a plan as to how you, the Provincial Mines Ministers, might collectively do this. A plan which, if properly executed, will go a long way to solving our educational needs and improve the image of the mining industry and all those associated with it. The plan is this:

That each one of you, the Provincial Mines Ministers, hold a concurrent one-day conference in each of your Provincial capitals to which you would invite representatives of the mining industry, educational institutions, and pertinent associations in your Province to discuss the educational needs and requirements of the mining industry. In order to have the proper effect and correlation with the other Provinces having similar conferences at the same time, these concurrent conferences should be planned, organized, and run along very similar lines. One can readily imagine the impact on the public through the press, radio, and TV. of 9, or perhaps even 10, such conferences (if the Territories were included) being sponsored and chaired by the Minister of Mines in each Province at the same time, for the same purpose, and on the same subject. This is the kind of thing that makes news. Never before have the Provinces co-operated in the holding of concurrent conferences in order to achieve a mutual objective. I hope you will agree, gentlemen, that this plan is worthy of your serious consideration.

In your consideration of this matter, the following guide-lines or suggestions on how these simultaneous conferences might be organized and run might be helpful.

First, the concept must be approved by you, the Provincial Mines Ministers, and each Province should be prepared to underwrite the cost of the conference.

A small working committee should be appointed with the responsibility of co-ordinating the programme between the Provinces, prepare an agenda, etc. The General Committee on Education, C.I.M., would be pleased to give any assistance it can to this committee.

Prior to holding these conferences, it is recommended, since it is almost mandatory to the success of the conferences, that each Province conduct a supply-and-demand survey of the various skills and professions required now and in the future by the mining industry. All pertinent educational institutions and all mining companies should be included in this survey. The survey plan should be similar in each Province, and it is suggested that the services of a Provincial Government economist be seconded for this purpose. Besides obtaining current and projected statistics on the supply and demand of both the numbers of personnel and the kind of professional and technical skills required by the mining industry, the survey might also include comments on the curriculum and professional groupings now in existence to see if they satisfy the present and future needs of the industry; the occupational mobility of engineers and scientists in the mining industry and ways and means of improving it; correlation and co-ordination between economic development activities and policies; and the development of education.

The results of these individual Provincial surveys should then be combined and correlated to present the National picture so that at each conference both the Provincial and the National picture can be presented. The assistance of the Economic Council of Canada might be obtained to perform this function.

Briefs or papers might be invited from representatives of educational institutions, mining companies, associations, and other government departments or agencies.

Each conference should be chaired throughout by the Mines Minister, and should be opened by him giving an address on the importance and achievements of the mining industry in his Province, tying his remarks in with the educational needs of the industry. It is important, we think, that each conference be opened on a positive note to impart the proper image of the industry to the public.

It is further suggested that each conference end with a reception and banquet, at which the Premier of the Province would speak on the potential of the mining industry in his Province; the increased interest and activity in research and development; the possibility of more value being added to the raw material by more complete processing and manufacture; and finally, in order to accomplish these objectives, the need for more skilled workers and professionals in the mining industry.

Again, gentlemen, I suggest to you that if all the Ministers of Mines on the same morning and all the Premiers of the Provinces on the same evening speak on the same general subject, for the same purpose, every reading, seeing, or listening Canadian across Canada will know about it.

The pre-conference surveys and the concurrent Provincial conferences could be completed by June, 1966, and the proceedings of all the Provincial conferences could be edited, compiled, correlated, and published by January, 1967, as a most worthy Centennial project for the Provincial Ministers of Mines. We hope you agree and will put your offices and Governments behind it. If you do, it is our conviction that it will supply the best answer to your Resolution No. 3 of last year asking us to report on the lack of incentives for young people to embark on professional careers in the mineral industry.

If I may quote the O.E.C.D. Committee for Scientific and Technical Personnel again: " Canadian prosperity will in the long run depend on the exploration of a judicious mixture of its rich reserves of natural resources and its equally rich—but almost untapped—reserves of scientific ingenuity and technological competence."

Thank you for the privilege and opportunity of making this presentation.

EDUCATION AND THE MINERAL INDUSTRY

An open discussion was held on Monday evening, September 13th, with Mr. Stuart Anderson acting as chairman. As an introduction to the subject, the chairman addressed the meeting as follows:—

This is the evening meeting of the Committee on Education of this Mines Ministers' Conference. It was scheduled for an open evening session in view of the feeling of those here in British Columbia who were working so diligently on a programme for this conference that the subject to be discussed by the panel this evening would be of considerable interest.

The subject of this night session is, as you know, "Education and the Mineral Industry." Before introducing the panelists, I will take the liberty as chairman of saying one or two things about this particular subject. Earlier this afternoon in our Education Committee meeting we were discussing the desperate shortage of trained mining personnel both at the professional and non-professional levels. It has been proposed that we start a nation-wide survey to discover much more exactly than has yet been done what the real present and looming future shortages may be. The whole industry is gradually becoming aware that their problems as individual companies are common to all of them, and I think that the nation must shortly come to realize the fact of these substantial present and future shortages as well.

One feels, as a lay observer talking to the mining-industry people and indeed to the managerial groups of other primary-resource industries, that there has been a tendency to feel that the farming populations of Canada would provide, through their strong, able-bodied, and competent sons, the basic working forces needed in the primary-resource industries, including mining. My own feeling is that this source can no longer be relied upon.

The nation is surely aware of the fact that on the Prairies the number of farm families has diminished sharply in these post-war years with the tremendous consolidation of individual farm units into ever-larger and more economic land groupings. This has been made possible by the introduction of modern machinery and technologies on the farm, and it is resulting, and will continue to result, in a continuing drop in the supply of young farm men for the resource industries. At the same time the rising affluence of the farming population by reason of these very aggregations of land enables the farm boy to head into the educational stream and go just as far as his urban neighbour. As a result, the very competent group of young men from the farms that served Canada and Canada's mining industry so well for many decades past has now become much more selective in the choice of occupations. One almost concludes that the personnel policies of the mining industry as well as of the primary-resource industries may have to shift away from older ideas about the supply and retention of working forces. Industry will have to think its way through to the kind of changes that will be necessary to attract urban as well as farm folk to the rather isolated resource areas.

A recent team of Canadian Government people who visited Russia this year learned something of the devices that Russians are using to make their frontier cities attractive to a society which is no longer responding to state compulsion but rather is influenced by a growing affluence and by the kind of incentives that are perhaps more widespread in our part of that government group of the western world. It was the Honourable Mr. Laing who told me in Winnipeg in June that he was curious about what incentives there were for people who live in far-away places in

Russia. He therefore made inquiry of one very bright young person, who assured Mr. Laing that he was getting 80 per cent more for his work in the particular northern Russian community where he worked than he would for an identical job in Moscow. One swallow doesn't make a summer, and one statement is by no means strong enough to build a whole new policy on. Nevertheless, we probably need serious study and research to discover the kinds of motivation and incentives that will have to be used over the years ahead if we are to supply an adequate force to man our tremendously important mineral industry. This sociological type of research may well be more important in the long run than all the industrial and market research that is now being done by the mining and other primary-resource industries.

The chairman then introduced the four panelists, whose names and affiliations are: Mr. E. C. Roper, principal of the British Columbia Institute of Technology; Profs. C. L. Emery and L. G. R. Crouch, of the Department of Mineral Engineering, University of British Columbia; and Prof. P. M. Dranchuk, Department of Chemical and Petroleum Engineering, University of Alberta.

The papers prepared for the discussion are reproduced in these proceedings in the order of their presentation.

BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY AND ITS PLACE IN EDUCATION FOR THE CANADIAN MINING INDUSTRY

By E. C. Roper

INTRODUCTION

The urgent need for skilled manpower to support the rapid growth of the Canadian mineral industry is of prime importance. The lack of appreciation for, or interests in, this need by all the trustees who have a vested interest in this bountiful Canadian natural resource is inexcusable.

This paper will consider three aspects of the training of skilled manpower for the mining industry—the nature of technical training and its place in post-secondary education, financial assistance for training of technicians for the mining industry, and technical training in mining at the British Columbia Institute of Technology, and describe briefly some aspects of training technicians for the mining industry in Australia.

THE NATURE OF TECHNICAL TRAINING AND ITS PLACE IN POST-SECONDARY EDUCATION

Perhaps some confusion arises from the often loose terminology applied to graduates from post-secondary educational institutions throughout Canada. To outline the framework within which mining technician training exists, the following description of three levels of training—professional, technical, and vocational—is offered.

Professional Education

University or college education leading to the baccalaureate degree at the undergraduate level and to advanced degrees at the graduate level. The objective of the professional schools is to educate in an organized body of theory and relate subject-matter fundamental to the practice of the profession. My colleagues on this panel for Committee No. 6 are most able to deal with every aspect of need for this vital training.

Technical Education

Mining education presented at Institutes of Technology or Technical and Trades Institutes prepares men to serve as technicians and administrative assistants to professional mining engineers. All candidates have completed at least Grade XII on entry and must master two or three years of difficult theory, together with its practical application, before qualifying for a Diploma of Technology in Mining. Many associated programmes, such as Metallurgical, Mechanical, Electrical, Surveying, and Instrumentation and Control Technologies, also train excellent skilled manpower for the mining industry.

It is in this category that the most confusion has grown in terminology. The placement of the technician in appropriate positions between the vocational and professional levels is a problem of this explosive technological age in North America. Europe, Australia, Asia, and South Africa have recognized the various levels of training for a long time. A team of world-renown educators has just concluded a survey (Report on the Education and Training of Engineers of Non-university Level and Technicians in Canada—Part 1—O.E.C.D., Paris, October 31, 1964, page 67, Conclusions), wherein they state, in part, ". . . Even within industry there remains much

scope for a better appreciation of the functions of the technician and of the kind of training which industry can give best."

A modern professional engineer is no longer a nuts-and-bolts man; he is not trained to do the mechanical chores of engineering and will choose not to handle them. The goal of a technical institute is to provide training in applications engineering; the engineering technician is an applications engineer.

The programme of Mining Technology is designed to serve the mining industry by preparing technicians to help search for new mineral deposits, develop and operate new mines, and design and operate new mineral-processing plants. Most students who complete this programme can expect to enter the industry as exploration assistants mapping structure, logging drill core, or performing geophysical and geochemical tests in the field; as engineering assistants sampling developed rock, surveying in pits or underground, or doing production control work in mines; or as test laboratory technicians, assayers, or junior operating staff in mineral-processing plants.

Vocational Education

Vocational education is education or training in a single specific skill or task, as those of a miner, diamond driller, mechanic, electrician, assayer, or stenographer, which is part of the over-all conduct of a mining business. The objective of vocational training is to increase the efficiency of skilled and semi-skilled workers on clerical, manual, or mechanized jobs.

The mining industry needs a number of skilled craftsmen but is doing little to train them. In fact, amendments to the Tradesmen's Qualification Act passed last year provide that no person may work in a designated trade unless

(*a*) he is under contract of apprenticeship; and
(*b*) he holds a certificate of apprenticeship; or
(*c*) he holds a current certificate of proficiency; or
(*d*) he has obtained an exemption from the foregoing requirements which under certain conditions may be granted by the Minister.

At present, less than 10 per cent of the operating mining properties in Canada are accredited to qualify as apprenticeship training operations.

Other industries have met the challenge of vocational " work-based training." In Europe, South Africa, and Australia, the mining industry has developed excellent work-based training schemes for their craftsmen. A skilled work force continually adds to the quality of the product produced. How long can the Canadian mining industry drift without an intelligent approach to skilled tradesmen training? I do not know! This presentation is primarily concerned with technical education; however, I recommend that vocational education should receive equal emphasis in another mining conference at a very early date.

FINANCIAL ASSISTANCE FOR TRAINING OF TECHNICIANS FOR THE MINING INDUSTRY

In view of the fact that this paper is mainly concerned with mining technicians and their training, and to clarify what assistance—financial and educational—is readily available (at no direct cost to mining operations), some of the supporting Statutes are described.

The Technical-Vocational Act of 1960

Although the Federal Government does not have direct interest or responsibility in the field of education or training, it does have an interest in the graduates of the education programme when they become part of the labour force. For this reason, the *Technical and Vocational Train-*

ing Assistance Act (Bill C-49) was passed in Ottawa in December, 1960. Thereby the Federal Government agrees to reimburse the Province for 75 per cent of the cost of new buildings and equipment until a limit based on population is reached and thereafter at 50 per cent of the cost. In addition, by individual Federal-Provincial Agreements, the following programmes share direct operating costs subsidy.

Table 1.—Operating Costs, Federal-Provincial Sharing by Programmes

Title	Purpose	Share	
		Provincial	Federal
		Per Cent	Per Cent
Programme 1	Secondary School Vocational Programmes	Variable	Variable
Programme 2	Technician Training in Institutes of Technology	50	50
Programme 3	Trade and Occupational Training in Adult Vocational Centres	50	50
Programme 4	Co-operative Industry-School Programmes	50	50
Programme 5	Training the Unemployed	25	75
Programme 6	Training the Handicapped	50	50
Programme 7	Training Vocational Teachers	50	50
Programme 8	Training for Federal Agencies	—	100
Programme 9	Student Assistance	50	50
	Under separate agreement: Apprenticeship training	50	50

Nearly $1 billion has been expended or committed to date under this legislation and subsequent extensions and agreements, and every Province has been invited to participate in this opportunity to enhance their skilled training facilities. Many industries have grasped this opportunity to benefit ultimately from the graduates by taking an active interest in the programmes and curriculums being planned and offered. But not the mining industry. Yet the urgent need is obvious, for frantic plans are being constructed to import foreigners to fill the need for skilled workers. This, despite the fact that some 200,000 young Canadians must find employment every year for the next 10 years if the goals of Dr. Deutsch's Economic Council are to be met. The Canadian mining industry is over 70 per cent foreign owned and enjoys stable government with tax incentives for the development of a natural resource. The trustees must accept the responsibility for the future development of its human resource or lose the privileges it now enjoys in harvesting Canada's natural resource.

Two plus Two equals Four

In my view, the needs of the mining industry for technicians and technologists can, and should be, met by training Canadians.

With proper effort by all concerned, the task at hand is not too difficult. Let's study the facts. Two plus two equals four—with reference to the programmes under the Technical-Vocational Act, 1960.

Programme Two: Technician Training in Institutes of Technology

A year ago, at the official opening of the British Columbia Institute of Technology, the Honourable Allan J. MacEachan, Minister of Labour for Canada, announced that 602 projects had been completed under the total programme. At the same ceremony Premier W. A. C. Bennett announced a $7½ million extension to B.C.I.T. to double its student capacity.

There are now 40 active institutions under Programme Two in Canada, thereby doubling, since 1960, the potential enrolment from 8,000 to 16,000 students. Ontario, alone, has 10 more institutes of technology in the planning stage.

But only two* of these institutes offer mining programmes.

Table 2.—Mining Technician Training[1]

Institute	Particulars					Potential Graduating Students			
	Length of Course	Minimum Education	Student Tuition Fees ($/Year)	Minimum Age	Advisory Committee	1964 Actual	1965	1966	1967
Provincial Institute of Mining (Ontario)	2 years	Gr. XII	$185	18	Yes	42	42	61	?
	3 years	.....	.....	.....	.....	.....	23	.....	.....
British Columbia Institute of Technology (Mining)	2 years	Gr. XII	$150	16	Yes	.....	.....	9	12
Totals	.....	.....	.....	.....	.....	42	65	70	?

[1] Completed January 7, 1965, by Secretary, General Committee on Education, C.I.M.

After closing because of the lack of students in the early 1940's, the Provincial Institute of Mining at Haileybury, Ontario, has operated continuously since 1945 and recently at near capacity.

The Mining Programme at the British Columbia Institute of Technology was the only programme (other than Gas and Oil) which was not oversubscribed at last year's opening. Despite a potential capacity of 30 students, Mining found only 12 applicants; therefore, no additional capacity is being planned for the Mining Programme in the current extension plans of the Institute.

The lack of technically trained employees in the mining industry in Canada makes pointless any reference to the acceptable ratio between technical and professional trained employees in the work force.

In the past 19 years 684 students have completed the course at the Provincial Institute of Mining at Haileybury, Ontario. About one-half of them are employed in engineering and survey departments of mines. Others are in gold-silver and base-metal assay laboratories, in geological departments of mines, and in milling plants and smelters. Some are engaged in prospecting and exploration, many are mine foremen, and many are technical sales representatives for manufacturers of mining equipment and supplies.

The curriculum at the British Columbia Institute of Technology will be detailed in a part of this paper.

Additions to Programme Two

Plus Two: Additional Supporting Programmes at Institutes

At Asbestos (Thetford), Quebec; St. John's, Newfoundland; and Yellowknife, N.W.T., one-year trade-technical mining programmes serve the local mining community.

Related programmes (viz., Exploration Technology at N.A.I.T., the Chemical and Metallurgical Technology at B.C.I.T.) as well as metallurgical programmes in other Canadian institutes provide excellent graduates for a segment of the mining industry.

* Recently the construction of an institute at The Pas, Manitoba, was announced to include a two-year post-secondary mining programme. The Lakehead College in Western Ontario has offered a mining programme for a number of years but recently has not attracted any participants.

Similarly, the industry would be well advised to consider seriously graduates from several institutes of technology across Canada where mechanical, electrical, survey, civil and structural, instrumentation and control, or business programmes are given. Every mining property needs some of these well-trained graduates. However, the competition from other industries for these graduates is severe.

Programme Four Equals Four: Industry's Effort

Programme Four is a training service designed to develop co-operative programmes between school and industry (exclusive of apprenticeship service). Programme Four is work-based training as distinct from Programme Two, a school-based training programme. Work-based and school-based schemes are popular means of training skilled manpower in England, Europe, South Africa, and Australia.

In point of fact, Programme Four is being used fairly extensively by other industries in Canada.

The 1963 survey of 11,875 establishments showing technicians employed and the extent to which training within them is available for technicians follows.

Table 3.—Training of Technicians in Industry[1]

Industrial Group	Number of Establishments in Survey (Approx.)	Number of Establishments Employing Technicians	Number of Establishments Training Technicians	Col. 3 as a Percentage of Col. 2	Number of Technician Trainees
Manufacture	9,845	2,003	233	11.6	3,223
Mining	600	173	17	9.9	119
Transportation and communication	1,230	173	54	31.3	8,941
Public utilities	200	94	26	27.7	274
Totals	11,875	2,443	330	13.5	12,557

[1] Page 55, "Report on the Education and Training of Engineers of Non-university Level and Technicians in Canada," Directorate for Scientific Affairs, O.E.C.D., Paris, October 31, 1964, Part 1.

To relate the figures quoted—a large sample but not the total of industrial enterprises in Table 3—to the school-based training of 16,000 technicians under Programme Two, a comparison of the duration of organized tuition within industry is important.

Table 4.—Duration of Technician Training Courses in Industry[1]

Industrial Group	Number of Establishments Conducting Courses of—					Total
	Less than 40 Hours	40 to 199 Hours	200 to 599 Hours	600 to 1,199 Hours	Over 1,200 Hours	
Manufacturing	36	97	51	39	68	291
Public utilities	4	12	4	2	12	34
Transportation and communication	16	37	27	10	7	97
Mining, etc.	1	7	5	1	4	18
Totals	57	153	87	52	91	440

[1] Page 56, "Report on the Education and Training of Engineers of Non-university Level and Technicians in Canada," Directorate for Scientific Affairs, O.E.C.D., Paris, October 31, 1964, Part 1.

In summary, Table 4 indicates about 70 to 75 per cent of the students receive less than 600 hours of instruction, and this includes 20 per cent obtaining less than 40 hours.

The over-all picture of technician-training in the mining industry is not one of outstanding effort.

However, manpower adjustment at the company level in response to technological or economic changes usually brings to light three distinct categories of problems. These may be termed

(*a*) industrial relations problems;
(*b*) training problems; and
(*c*) labour-market problems.

It is recognized that for proper and comprehensive manpower adjustment at the firm or industry level, no one of these three areas can be treated to the exclusion of the other two. For example, the preparation and application of a training programme designed to meet certain training needs will not suffice without reference to industrial relations and labour-market problems in genuine cases of manpower adjustment.

The Labour Department has appointed competent regional representatives to the Manpower Consultative Service to assist employers and educators in any joint effort designed to improve the skills of the labour forces. As a former mining employer turned educator, I urge the industry to make use of this means to train and retrain skilled manpower.

TECHNICAL TRAINING IN MINING AT THE BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY

In the light of the degree of Provincial autonomy enjoyed in Canada, it is not surprising to find that the structure of the courses at institutes of technology varies considerably between Provinces. The institute I represent, like many others, owes its origin to a team of industrialists, professional men, and educators working with and under the Technical and Vocational Branch of the Provincial Department of Education to research, plan, and guide the construction, programming, and staffing for the official opening last fall.

The co-operation between the spheres of government, the professions, industry, and education is perhaps made evident by relating that 17 separate post-secondary programmes are being offered simultaneously at the Institute. Each programme is supported by its own Advisory Committee, which is responsible to the Senior Advisory Council under the chairmanship of Dr. J. F. K. English, Deputy Minister of Education. The Federal and Provincial Governments chose Burnaby, the centre of population of the Lower Mainland, for the location. The Institute stands on spacious, well-kept grounds on Willingdon Avenue. The buildings are examples of attractive yet efficient architecture housing $2½ million worth of the most up-to-date equipment available.

The 17 programmes include 2 in medical (Medical Laboratory, Medical Radiography), 3 in business (Broadcast Communications; Business Management; Hotel, Motel and Restaurant Management), 12 in the scientific fields (Building Technology, Chemical and Metallurgical, Civil and Structural, Electrical and Electronics, Food Processing, Forest Products Utilization, Forestry, Gas and Oil, Instrumentation and Control, Mechanical, Mining, Surveying).

The Mining Programme is typical of most of the programmes, requiring Grade XII University Entrance with majors in Mathematics and Physics to qualify for enrolment and a concentrated two-year curriculum—15 weeks from September to Christmas and 20 weeks from January to June. Each week consists of 35 hours of tuition, divided between 15 hours of lectures and 20 hours of laboratory work. This laboratory work includes seminars, tours of actual operations in the field, and study and problem periods.

Without attempting to discuss the curriculum in detail, the following subject tabulation in total hours for the two years is given:

Table 5

Subject	Hours	Subject	Hours
Mathematics	350	Engineering Materials	70
Geology	227	Statistics (1620 Computer)	60
Physics	210	Strength of Materials	60
Chemistry	210	Hydraulics	60
Surveying	210	Work Study	60
English	190	Tutorials	60
Mining	190	Business and Economics	45
Mineral Processing	152	Geophysics	20
Assaying	140		
Draughting	105		2,419

Mining students are trained in the use of advanced equipment such as the theodolite, geodimeter, and telurometer for surveying; the polarograph, spectograph, and X-ray scintillometer for assaying; self-potential, equi-potential, and magnetometer devices for exploration. Together with this, they will have thorough training in the routine techniques of both field and office engineering as well as modern underground and surface mining methods. Further, their studies in mineralogy, structural geology, and mineral deposits are well advanced, and when combined with their studies in materials testing equipment and techniques provide them with an excellent foundation for the rapidly developing applications in geological control and rock mechanics.

In October of this year the Evening Division will offer credit courses at the Institute. In addition, tutorial programmes have been developed with the Society of Architectural and Engineering Technicians of B.C. and the B.C. Society of Professional Engineers whereby the Institute will offer courses closely related to qualifying examinations within the technician and engineer associations. Specialized courses will be provided where a demonstrated demand exists for post-secondary training or re-training.

On tour with delegates to the Eighth Commonwealth Mining and Metallurgical Congress in Australia last March, I was impressed with the way the Australians have developed post-high-school training to meet the needs of their mining industry.

SOME ASPECTS OF TRAINING TECHNICIANS FOR THE MINING INDUSTRY IN AUSTRALIA

The articulation of secondary and tertiary education to meet the needs of the Australian mining industry is well advanced in technician-training in comparison with similar developments in North America. The influence of the English educational system is apparent, and in my view has been of significant benefit to skilled manpower development.

The scope of this paper does not allow detailed comparisons nor is it suggested that an Australian solution can be adopted *per se* for the Canadian scheme. However, Canada can adopt, and benefit from, the educational experiences of other countries if for no other reason than the fact that $3½ billion of Canadian mineral wealth is exported to world markets without the benefits of protective tariffs. Parallels are difficult to establish in terms of dollar value of mineral production, but British Columbia ranks fifth as a Province in Canada, and South Australia ranks third as a State in Australia (*see* Appendixes A and B).

The British Columbia Institute of Technology has a potential enrolment of 1,500 students, whereas the South Australia Institute of Technology alone enrolled 3,574 in 1963 without including the Whyalla and Port Pirie Divisions even though the population of South Australia is only half that of British Columbia.

In addition, there are dozens of integrated work-based, day-release, evening programmes and correspondence upgrading courses being operated at the institutes in co-operation with the related industries (*see* Appendix C).

The quality of the curriculum offered is best illustrated by the fact that many of the top management personnel who were our hosts graduated from school-based and work-based Australian Institute of Technology programmes.

CONCLUSION

Professional co-operative programmes are a fact at the University of Waterloo at the undergraduate level and soon will be available at U.B.C., McGill, and Queen's Universities at the post-graduate level.

For every professional employee there should be three technical employees. In the mining industry, the ratio is reversed at present.

I respectfully suggest that

(1) more effective use can be made of every professional engineer who is supported by a competent team of technicians;

(2) the graduates of institutes of technology will become competent application engineers;

(3) the industry should seriously consider

(*a*) a block release of proven employees to further institute training;

(*b*) a crash effort of work-based upgrading courses in co-operation with the Manpower Consultative Service and educators;

(*c*) a short-term effort of co-operation with institutes of technology to train and re-train key employees on the production team to the use of new technological developments.

Finally, benefits must be paid for. Since both the country and the mining industry benefit from the training or re-training of manpower, the cost should not be borne solely by the public. Therefore, the mining industry should be prepared to support competent candidates for such training.

Therefore, it is recommended that this Mines Conference form a standing committee to promote co-operative technical training of employees for and in the mining industry to help meet the urgent needs for skilled manpower.

APPENDIX A

MINERAL PRODUCTION OF BRITISH COLUMBIA IN 1964

(Press release by the Honourable Donald L. Brothers, Minister of Mines and Petroleum Resources, issued at Victoria, B.C., 10 a.m., Wednesday, July 14, 1965.)

The mineral production of British Columbia had a value of more than $267 million in 1964, exceeding the 1963 value by $11.6 million or 5.0 per cent. The 1964 value is a new record high. Quantities for several metals were somewhat less than in 1963, but good prices for silver, copper, lead, and zinc, and for several by-product metals, gave an over-all increase for metals. Values for each of the other groups—industrial minerals, structural materials, and fuels—also exceeded 1963 values. The value for structural materials was 11 per cent higher than in 1963 and natural gas increased 13.7 per cent.

	1963		1964	
	Quantity	Value	Quantity	Value
Metals—				
Gold, lode and placer oz.	158,567	$5,985,869	139,949	$5,283,075
Silver, lode and placer oz.	6,422,680	8,861,050	5,269,642	7,348,938
Copper lb.	118,247,104	36,238,007	115,554,700	38,609,136
Lead lb.	314,974,310	37,834,714	268,737,503	39,402,293
Zinc lb.	402,863,154	53,069,163	400,796,562	58,648,561
Iron concentrates tons	2,060,241	20,746,424	2,002,562	20,419,487
Nickel lb.	3,699,402	3,107,498	3,398,560	2,854,790
By-product and other metals		7,010,141		8,360,049
Totals, metals		$172,852,866		$180,926,329
Industrial minerals—				
Asbestos tons	63,215	$11,681,337	67,460	$11,714,494
Sulphur tons	254,197	3,673,997	278,385	3,860,436
Other industrial minerals		1,155,564		1,772,225
Totals, industrial minerals		$16,510,898		$17,347,155
Structural materials		$23,882,190		$26,428,939
Fuels—				
Coal tons	850,551	$6,237,997	911,326	$6,327,678
Natural gas M s.c.f.	105,525,373	10,719,298	118,959,880	12,192,816
Natural-gas liquid by-products bbl.	614,249	189,977	706,563	226,100
Oil bbl.	13,458,739	25,470,361	12,474,054	24,047,837
Totals, fuels		$42,617,633		$42,794,431
Grand totals		$255,863,587		$267,496,854

Average prices used (preceded by 1963 prices in brackets) are: Gold ($37.7545), $37.7496; silver (137.965 cents), 139.458 cents; copper (30.472 cents), 33.412 cents; lead (12.012 cents), 14.662 cents; zinc (13.173 cents), 14.633 cents.

The premium on the United States dollar in Canadian funds ranged over narrow limits, and was lower in December, 1964, than in January. The average for the year was 7.856 cents on the dollar, compared with 7.87 cents in 1963. The premium affects most of the metals. The price for silver was very steady during the year, changes being due to the changes in the exchange premium. Prices for copper, lead, and zinc increased during 1964. The December average price for each of the three metals was the highest for any month of the year.

All values and prices are in Canadian funds. The figures are compiled by the mining statistician of the Bureau of Economics and Statistics, Department of Industrial Development, Trade, and Commerce, and are based on returns made by producers of metals, industrial minerals and some structural materials. The figures for fuels are based on data supplied to the mining statistician by the Deputy Chief Inspector of Mines and the Chief of the Petroleum and Natural Gas Branch, of the Department of Mines and Petroleum Resources, based on returns to the Department by the producers each month.

APPENDIX B

THE MINERAL RESOURCES OF SOUTH AUSTRALIA

The production of the major minerals is listed below, together with their value, for 1963.

	Tons	Value
Iron ore	4,242,342	£18,939,800
Barite	6,680	45,491
Clay (all types)	488,346	340,823
Coal	1,511,719	1,447,277
Dolomite	200,844	159,187
Gypsum	497,886	592,911
Limestone (all sources)	1,574,102	1,182,341
Opal	—	1,143,456
Pyrite	380,437	581,490
Salt	459,005	918,010
Talc	7,005	38,420
Other (including construction materials)	—	5,826,322
Total value		£31,215,528

APPENDIX C, EXHIBIT 1

CERTIFICATE COURSES

Part-time courses, of up to five years' duration, are offered in New South Wales, Victoria, Queensland, and Western Australia; these are designed to provide training of a technical nature, and their successful completion is marked by the award of a certificate.

Certificate Courses in Mining and Metallurgy

State	Course	Length of Course (Years)	Enrolments[1] for All Years
New South Wales	Coal Mining	4	60
	Coal Mine Surveying	4	25
	Metalliferous Mine Surveying	4	6
	Metallurgy	4	180
Victoria	Assaying	4	?
	Geology and Ore Dressing	4	
	Heat Treatment	5	
	Mine Management	3	
	Mining Engineering	4	
	Secondary Metallurgy	5	
Queensland	Preliminary Mining	1	23
	Colliery Manager's	5	
	Coal Mine Surveying	3	4
	Mine Electrician's	2[2]	5
	Geology	3	8
	Metalliferous Mine Surveying	3	
	Assaying	3	
Western Australia	Assaying	4	5
	Metalliferous Mine Surveying	4	41

[1] Average for five years ending 1963.
[2] After electrician apprenticeship.

APPENDIX C, EXHIBIT 2

Address all Mail to the Manager at
P.O. Box 219, Port Pirie

THE BROKEN HILL ASSOCIATED SMELTERS PROPRIETARY LIMITED
(Incorporated in Victoria)

SMELTING WORKS
PORT PIRIE, STH. AUST.

B.H.A.S. EDUCATIONAL TRAINING SCHEME

METALLURGICAL CADETSHIPS

1. The B.H.A.S. Metallurgical Cadetship Scheme is a most successful and remunerative training scheme, which offers outstanding opportunities to young men of scholastic ability, who desire to establish themselves in a professional career associated with the application of science and technology—mathematics, physics, chemistry, economics, etc.—to the nationally important function of extracting refined metals from metalliferous ores.

2. The Scheme provides a training curriculum of either 5 years duration for Leaving Honours entrants, or 6 years duration for Leaving standard entrants, and it combines part-time studies for the S.A. Institute of Technology's Associateship Diploma Course in Primary Metallurgy, with a well balanced and complementary programme of practical experience at the Company's Works, which are recognized as the largest and most technically advanced lead smelting and refining plant in the world.

3. An average number of 20 cadets are continually engaged at various stages of progress under the Scheme and an intake of between four (4) and six (6) new cadets is made in February of each year.

Such vacancies are advertised in the press during November and December, and applications are invited from young men under 18 years of age who have passed or anticipate passing the undermentioned prerequisite subjects at P.E.B. Leaving Examination standard:—

ENGLISH: MATHS I & II: PHYSICS: CHEMISTRY:

Selection procedures are finalised as soon as practicable following publication of the P.E.B. Examination results, and the intake normally includes an equal division of Leaving and Leaving Honours entrants.

4. During the initial 3 or 4 years of employment Cadets are engaged as junior staff members and their programmed practical experience includes performance of routine duties, in the undermentioned departments:—

Assay Department Research Department Drawing Office Metallurgical Department

In the subsequent 2 years of their training, Cadets are attached to each of the major departments within our Production Division, namely:—

Sintering Department Blast Furnace Department Refinery Department Acid Plant

This latter practice enables Cadets to obtain a first-hand knowledge and appreciation of the many and various metallurgical operations which collectively represent the entire production at these Works.

For these purposes, Cadets are classified as supernumary plant operatives and are required to transfer to our daily-paid labor force, which entails becoming a member of the Australian Workers Union.

5. The current syllabus of the Associateship Diploma Course in Primary Metallurgy, which is undertaken by Cadets at the Port Pirie Division of the S.A. Institute of Technology is as follows:—

Subject	Hours per Week Lectures	Practical
First Year		
Chemistry IA	2	3
General Mathematics	5	1
Second Year		
Chemistry I, Organic	1	2
Engineering Drawing and Design I		4
General Physics	3	3
Third Year		
Chemistry IIA Inorganic & Phys.	2	7
Materials and Structures	2	2

Subject	Hours per Week Lectures	Practical
Fourth Year		
Electrical Engineering IIAT	2	2
Engineering Drawing and Design II	1	3
Mechanical Engineering IT	2	
Engineering Materials	2	2
Metallography		3
Fifth Year		
Analytical Chemistry	1	3
Geology IA	2	2
Industrial Economics	1	
Industrial Instrumentation	1	3
Sixth Year		
Applied Chemistry—Inorganic	1	3
Applied Chemistry—Metallurgy	1	3
Mineral Dressing	2	3
Unit Operations	1	3

Exemptions from Chemistry IA, General Mathematics, and General Physics are applicable to Cadetship entrants who have passed the equivalent subjects at Leaving Honours level, and this factor enables such cadets to complete their training within a 5-year period.

6. The current annual salary/wage scale applicable to Cadets is shown hereunder, and it will be noted that it includes a variable bonus.

	Salaries	Wages	Bonus	Total
1st Year	£490		£160	£650
2nd Year	630		205	835
3rd Year	790		260	1050
4th Year	950		300	1250
5th Year		£1150	340	1490
6th Year		1150	340	1490

In order to qualify for the full annual increases shown in the salaries section of the above scale, Cadets must pass all subjects prescribed in each of the initial 3 years of the Diploma Course Syllabus.

Cadets who are granted exemptions from any such subjects on the basis of Leaving Honours results, or otherwise pass subjects in advance of the prescribed Course, automatically qualify for pro-rata increases in salary.

Alternatively, Cadets failing to pass any prescribed subject during the initial 3-year period are only eligible for a proportion of the annual increase shown.

In addition to the salary/wage scale shown above, a Living Away from Home Allowance is payable to Cadets other than Port Pirie residents, as under:—

Year	Allowance per Annum 5-year Term	6-year Term
1st	£143	£169
2nd	91	143
3rd	.....	91

The above scales combine to provide the following table of annual earnings for various classifications of 1st year Cadets:—

Entrance Standard	Pirie Resident	Non-resident
Leaving	£650 p.a.	£819 p.a.
Honours	920 p.a.	1063 p.a.

Earnings of the Honours standard cadet in this table are based on the example of an entrant who obtains exemptions in General Maths; Gen. Physics; & Chemistry IA.

7. Throughout the 5 or 6 year training period, the work and progress of each individual Cadet is supervised by a Cadetship Committee comprised of senior Company Officers, the Principal of the Port Pirie Technical School, and the Lecturer-in-Charge of the S.A.I.T. Port Pirie Division.

This Committee reviews Cadets progress in both Associateship Diploma Course studies and Works Training at the completion of each academic term, and following reference to Management, issues an official report to each Cadet and his parents.

8. Cadets are permitted an average of 8 hours per week leave of absence with pay for lecture attendance purposes, and compulsory attendance at all daytime and evening lectures is a condition of employment.

Further, the terminal tuition fees paid by Cadets for their respective subjects are refunded by the Company at the end of the academic year, with the exception of fees applicable to " repeat " subjects.

9. Cadets are not required to enter into a bond with the Company in respect of post-graduate services etc., but at all times, the Company reserves the right to cancel a Cadetship if sustained and inadequate progress in either Diploma Course studies or Works training is evidenced.

10. Accommodation for non-resident Cadets can be arranged in selected private homes if so desired, at approximately £6-0-0 per week. In addition, Cadets have the opportunity of filling the limited vacancies which occur at the B.H.A.S. Staff Bachelors Quarters from time to time.

11. As regards completion of training and the prospects of subsequent employment with the Company, it is emphasized that a common and firm understanding is given to all Cadets, to the effect that they will be considered for any available Technical Staff vacancies at the time of qualifying for their Associateship Diplomas, but the numbers involved preclude any guarantee that appointments will be offered.

In instances where appointments are not offered, the ex-cadets concerned may be granted up to 6 months post-graduate employment, to assist them in locating suitable positions elsewhere.

12. As mentioned above, applications for appointments under the Scheme are invited by press advertisements in the November-December period of each year, and such applications should be submitted in hand written form, setting out full details as to age, secondary schools attended, educational qualifications etc., addressed to The Manager, The Broken Hill Associated Smelters Pty. Ltd., Box 219, Port Pirie, S.A.

FRANK A. GREEN,
Manager.

Port Pirie
RHM:MM
23/8/64

Address all Mail to the Manager at

P.O. Box 219, Port Pirie

THE BROKEN HILL ASSOCIATED SMELTERS PROPRIETARY LIMITED

(Incorporated in Victoria)

SMELTING WORKS

PORT PIRIE, STH. AUST.

ADDENDUM

W. S. ROBINSON MEMORIAL SCHOLARSHIP AWARDS

1. As means of further enhancing the Company's arrangements referable to the training of young men for a professional career in the Primary Metallurgy specialisation, W. S. Robinson Memorial Scholarships, valued at £600 per award, were introduced in January, 1964.

2. Such Scholarships are available to selected Diplomates who complete their training under the Company's Metallurgical Cadetship Scheme and are designed to enable the recipients to undertake full-time studies at the Adelaide University, in order to qualify for an Applied Science Degree in Primary Metallurgy.

The current conversion factor between the Associateship Diploma and Applied Science Degree courses in Primary Metallurgy is represented by the undermentioned 4 subjects, which can be studied concurrently in one academic year:—

Maths IE; Physics B; Applied Phys. Chem.; Extractive Metallurgy

3. It is estimated that a maximum of two such awards will be made annually, and although scholarship holders are expected to join the Company's permanent Technical Staff in the immediate post-graduate period and undertake at least 12 months service against the background that their promotional prospects can be regarded as above-average, no bond is imposed by the Company in this connection.

Port Pirie
RHM/BB
24/9/64

APPENDIX C, EXHIBIT 3

TEN TOP DIVIDENDS PAID BY CANADA'S METAL MINES[1]

Province and Mine	Total to Dec. 31, 1963	1964 Dividend
Ontario: International Nickel	$1,235,875,164	$105,000,000
British Columbia: Consolidated Mining & Smelting Co., Ltd.	549,063,498	24,572,468
Quebec: Noranda	266,382,599	20,000,000
Manitoba: Hudson Bay Mining & Smelting	248,907,063	9,652,906
Ontario: Hollinger	155,498,800	4,920,000
Ontario: Lake Shore	103,360,000	(1955 last payment)
Ontario: Dome	87,554,901	1,557,334
Ontario: McIntyre Porcupine	84,046,738	4,297,648
Quebec: Waite Amulet	67,155,000	(1961 last payment)
Ontario: Kerr Addison	65,278,159	2,807,438 (1964)
	$2,863,121,922	$172,807,794

[1] The Financial Post Survey of Mines, 1965, pp. 57–61.

DIVIDENDS PAID BY CANADA'S OIL COMPANIES TO DECEMBER 31, 1964[1]

		Estimated Percentage of Foreign Ownership[2]
B.A. Oil	$206,000,000	72.0
Imperial Oil	1,021,836,676	75.2
Canadian Petrofina	16,625,402	60.0+
Canadian Superior Oil	7,680,018	56.5+
	$1,252,142,096	

[1] The Financial Post Survey of Oils, 1965.
[2] From sources believed to be reliable by author.

APPENDIX C, EXHIBIT 4

TECHNICAL AND VOCATIONAL TRAINING AGREEMENTS

Table 1.—Capital Projects Approved, April 1, 1961, to March 31, 1965

Province	New School Facilities			Additions, Alterations, and Equipment, Existing Schools				Student Places	Total Estimated Cost	Estimated Federal Contribution
	Inst. Tech.[1]	Trade School	Voc. H.S.[2]	Inst. Tech.[1]	Trade School	Voc. H.S.[2]	Minor less than $10,000			
Newfoundland	1	12	—	—	1	—	1	3,570	$28,406,993	$20,974,258
Prince Edward Island	—	1	1	—	—	—	6	1,380	3,566,623	2,674,968
Nova Scotia	1	1	5	—	7	1	1	2,838	10,735,766	8,051,824
New Brunswick	2	4	—	—	2	1	27	2,645	10,137,794	6,814,124
Quebec	6	26	64	14	53	—	7	55,573	150,814,488	91,652,820
Ontario	2	9	230	5	10	55	22	140,458	454,254,802	241,835,625
Manitoba	1	—	—	—	4	10	42	2,440	7,805,702	5,468,889
Saskatchewan	1	—	4	1	—	4	—	3,804	17,506,701	8,630,436
Alberta	2	1	35	1	4	9	4	25,975	81,395,675	61,046,724
British Columbia	1	5	14	—	3	7	3	12,594	34,666,591	23,398,619
Yukon Territory	—	1	—	—	—	—	1	144	926,562	692,431
Northwest Territories	—	—	—	—	1	—	—	30	869,750	136,519
Totals	17	60	353	21	85	87	114	251,451	$801,087,447	$471,377,237

[1] All the institutes of technology listed will offer trade training courses with the exception of institutes in Ontario, the British Columbia Institute of Technology, and six of the institutes in Quebec.

[2] This category includes technical secondary schools and vocational departments in composite high schools.

Table 2.—Approved Capital Projects, Maximum Federal Contribution at 75 per Cent

(Based on $480 *per capita*, 15–19 age-group.)

Province	D.B.S. Census 1961 15–19 Age-group	Maximum Contribution at 75 per Cent	Total Approved Federal Contribution, Apr. 1, 1961, to Mar. 31, 1965
Newfoundland	43,829	$21,037,900	$20,974,258
Prince Edward Island	8,875	4,260,000	2,674,968
Nova Scotia	64,239	30,834,700	8,051,824
New Brunswick	53,514	25,686,700	6,814,124
Quebec	467,426	224,364,400	91,652,820
Ontario	436,883	209,703,800	241,835,625
Manitoba	70,808	33,987,800	5,468,889
Saskatchewan	72,864	34,974,700	8,630,436
Alberta	99,004	47,521,900	61,046,724
British Columbia	112,653	54,073,400	23,398,619
Yukon Territory	765	679,235	692,431
Northwest Territories	1,699	815,500	136,519
Totals	1,432,559	$687,940,035	$471,377,237

N.B.—After the amounts listed have been reached, the Federal contribution reverts to the normal 50-per-cent share.

ACKNOWLEDGMENTS

Data necessary to the preparation of this paper have been acknowledged in part by footnotes within the text. Other information was selected from the Institute calendar, technical and vocational association publications, and articles by post-secondary educators.

Appreciation is expressed to Mr. J. S. White, Director of Technical and Vocational Training Branch, Department of Education, Province of British Columbia, and Dr. C. R. Ford, Director, Technical and Vocational Training, Department of Labour, Ottawa, for permission to present this paper.

THE TRI-UNIVERSITY PROJECT

By C. L. Emery

SUMMARY

Over the past two decades, mining engineering education in Canadian universities has approached extinction, but there is good reason for believing that a recovery is not only possible but desirable and even essential. However, that recovery must be based, not on regeneration of the classic programme in mining engineering, but on the development of a new curriculum in mining engineering that will present and apply all of the new technology that is available and applicable to the operation of the mineral industry. To develop this curriculum, to verify its reliability, and to facilitate its adoption, Queen's University, the University of British Columbia, and Université Laval are proposing a joint effort in university education.

The Tri-university Project described in this proposal calls for co-operative development of research and teaching facilities among the three universities with the objective of developing a national approach to mining education. By this approach the advocating schools are confident that they can maintain their autonomy, meet the requirements of the Canadian industry at minimum cost, and establish in Canada a technical capacity to ensure the future competitive position of Canada's mineral industry. The central features of the proposal are the provision of means for co-ordinating the interests and activities of the three universities and the maintenance of a contact between the universities and the industry.

To co-ordinate the schools, an academic committee is proposed. This committee will advise the staff of each university on research activities and will thereby avoid unnecessary and constructive duplication of interests among the schools. Also, the academic committee will co-ordinate the transfer of staff and students among the three universities to give maximum opportunity for development of all personnel exposed to the Tri-university Project. By these activities the academic committee will effectively transform three autonomous universities into co-operating groups in a national plan.

If the project is to be successful, extensive co-operation among the universities, the Governments of Canada, and the Canadian mineral industry will be required. Not only must a great deal of financial support be provided, but also co-operation must be provided for the education programme, and preparations must be made for employment of the graduates of the new curriculum. To co-ordinate this work and to assist in establishing the programme, it is proposed that a steering committee be formed. In the same way that the academic committee is to co-ordinate the activities of the universities, the steering committee will co-ordinate the activities of the mineral industry. The total implementation of the Tri-university Project will therefore proceed through the joint activity of the academic and the steering committees.

In advancing this proposal, the three universities are confident of the success of the project, but, more, they believe that an effective programme can be established within about five years. That is, given the co-operation of the Governments of Canada and her Provinces, of the Canadian mineral industry, and of the three universities, a mining engineering training system can be developed within five years that will be the pride of the industry and will set an international standard in engineering education.

INTRODUCTION

After considerable study and careful analysis of the general decline of the Departments of Mining Engineering and the related areas of engineering for the mineral industries, three universities—Queen's University, the University of British Columbia, and Université Laval—have formed a co-operative triad in education for the mineral industries. The intent is to co-ordinate and to improve the resources of the three universities in equipment, staff, and curricula, to provide more and better-qualified graduates at various levels for employment in the mineral industries, and to do basic and applied research.

By agreeing to participate in this project, the universities are making a major commitment to mining engineering education. This commitment includes the effort of numerous staff, allocation of much space, and a sizeable investment in equipment and buildings. Much more important, however, is the fact that by undertaking the project, each university is making a major commitment of its academic judgment and its student interests to the mineral industry. It is essential, therefore, that the implications of the project be realized. These implications include the responsibility of the industry to accept the graduates of the project according to their qualifications, the co-operative teaching responsibility of the industry and of governing bodies, and the financial responsibilities to the project of both the industry and the government bodies.

This report constitutes both an offer by the universities to undertake the project and an invitation to the industry and the several Governments who will be concerned to participate in the project. Accordingly, the report includes an outline of the method of operation, scopes, and operating details of the Tri-university Project.

PROPOSAL AND METHOD

The three universities will work together in co-operation with the mineral industries to substantially expand and improve their graduate and undergraduate programmes. Specific objectives will include the following:—

(*a*) Provision of adequate research facilities and initiation of basic and applied research.

(*b*) The offering of graduate instruction at the most advanced level possible.

(*c*) Continual revision of undergraduate courses through exploitation of the new knowledge gained from the proposed research. As a corollary, this will ensure a challenging curriculum to students of good quality.

(*d*) Establishment of a research activity and capacity in which to study basic problems, both theoretical and applied, which have a potential for both early and long-term return in the mineral industries, particularly in mining.

(*e*) Development of a well-informed faculty for each university which, through continuous research, will keep abreast and contribute to changes in knowledge and know-how.

To avoid unnecessary duplication of expensive facilities while promoting the independent development of each university's programme, it is proposed to act as follows:—

(1) The three participants will co-ordinate their individual plans of instruction and research through an academic committee that will consist of not more than two representatives from each of the three universities. This academic committee will meet from time to time to assess the individual and the collective progress of the three universities and to make recommendations for further development.

(2) A steering committee to represent the Canadian mineral industry and Government will be formed to act as an advisory panel in defining and meeting the needs of the

industries. This committee will also offer guidance in disseminating the results of their programmes to the industries.

(3) The current academic needs and performance of the joint project will be reviewed and established by the academic committee and the steering committee. Initiation and handling of requests to granting bodies for support of the programme will be the responsibility of each university but may carry the endorsement of the combined academic and steering committees if this is sought and earned.

(4) Interchange of faculty and students in the graduate programmes of the three universities will be encouraged in all cases where interchange can be expected to benefit the students in particular, but also the staff and the over-all programme.

(5) Each university will foster its graduate programme to ensure that it yields enthusiastic and competent professional engineers.

SCOPE OF THE PROJECT

The Tri-university Project must be designed to provide well-trained graduates to meet the needs of the industry while also providing new knowledge for use in the industry. These two important products will be produced simultaneously from the well-balanced programme, and so several aspects of the programme will have to be analysed. These analyses, which are presented below, include the manpower requirements and preparation of the industry, staff requirements of the universities, the building and equipment and maintenance costs involved.

Manpower Requirements

To establish the technical personnel requirements for the Canadian mineral industry as far as universities are concerned, two groups must be considered: men holding advanced degrees, and men holding bachelors' degrees. In the proposed tri-university plan, only the requirements for men holding advanced degrees need be considered. This condition arises because, although bachelor degrees are essential, the need for integrating research into the undergraduate training organization becomes the critical factor in establishing a faculty that is competent to carry out undergraduate training.

The technology available for inclusion in an undergraduate training programme could probably be handled by a faculty of two or three *if there were no interest in keeping abreast of new technology*. However, that condition is entirely impractical; if undergraduate training is to prepare men for the competitive world of mining, the technology presented must be continually updated. The only effective way of accomplishing this is to increase the total faculty at each school so that each member of the faculty has *time* to continue research activity while still teaching undergraduates. Expressed otherwise, a continuing strong undergraduate curriculum is only possible when it is accompanied by a continuing strong graduate programme, and the requirements for the graduate programme will automatically provide the staff and the broad basis for undergraduate training. Accordingly, this proposal deals for the most part with the graduate programme, but *it is understood that thereby the undergraduate programme will automatically be available as required.*

It will be noticed that this programme does not directly involve the technical institutes such as the Provincial Institute of Mining. In fact the programme will effectively and properly *increase* the responsibility and opportunities available for these institutes by raising the technical content of the fields to which the university bachelor's degree will be mandatory.

Graduate programmes in the engineering fields of the mineral industry and particularly in mining engineering are almost non-existent in Canada. Furthermore, the industry has not had enough experience in the use of men having advanced technical training, especially in mining engineering, to provide a basis for estimating the needs of the industry. However, an estimate of those needs can be based on reasonable assumptions derived in part from experiences in other countries.

As a first approximation, the Canadian mining industry can be expected to require about 20 men per year holding advanced degrees in mining engineering. This estimate is determined as follows:—

One large company mining, say, 5,000 tons of ore per day, or a consulting group, could be expected to employ about five men at work demanding graduate education. It must also be expected that each of these specialists will be performing technical work for only about five years before moving on into administrative or other duties or into other companies. If the Canadian mining industry, including Governmental offices, is further assumed to consist of about 20 organizations of this size, the annual demand for men holding advanced degrees in mining engineering will be about 20 per year.

To estimate the graduate student enrolment required to produce 20 men per year for the Canadian industry, the time required for the graduate degree and the sources of students must be recognized. Advanced graduate programmes require from one to four or more years for completion; a reasonable estimate of the average time required is two years. In consequence, a minimum of 40 candidates must be enrolled in *advanced programmes* at the universities in the joint project in any one year. In addition, however, the bulk of the graduate students presently enrolled are from foreign countries, to which they are generally obligated to return as a condition of their travel grants from their Governments. If it is assumed therefore that about 50 per cent of the classes will be in this category, the total university facilities must be designed to accommodate about 80 candidates in advanced university programmes.

From the above arguments, it appears that the Tri-university Project must provide for between 20 and 30 graduate students per university. This estimate is more likely to be low than to be high if only because it assumes no material expansion of the Canadian industry beyond its current levels. It must also be recognized that this level of operation cannot be attained until enough suitable students are available and until the required academic staff are available. Optimistically, if the programme is initiated immediately, a minimum of about three years will elapse before the project could be expected to reach the proposed level of operation. Realistically, a development period of about five years should be assumed.

Industry Preparation

Over the past five years curricula in mining engineering have been revised radically to accommodate a great deal of new technology. Unfortunately, the universities as well as the industry have been lax in that means for making this technology available to practising mining engineers have not been stressed. Therefore, problems could be anticipated if large numbers of graduates trained under the new programme were to be suddenly thrust upon the industry. Accordingly, the universities recognize that under the proposed programme they will be obligated to make the techniques and courses which they are now presenting to the undergraduates available to those already in industry. At least two methods for accomplishing this can be assured and others will be sought.

A first approach to familiarizing industry with the new curricula includes providing the opportunity for graduate study to men currently in industry. This route is already available to

any engineers who choose and can arrange to take advantage of graduate study; the proposal, however, is that where practical such men be given *preference* in selecting the graduate students for the early years of the proposed mining programme.

As a second route, it is proposed that the universities will offer admission to practising engineers to graduate and undergraduate programmes on a special student basis. Under this provision, engineers may be encouraged to enrol at the university to take the scheduled courses according to their own choices to refresh or extend their knowledge of mining engineering. Hopefully, Canadian mining companies will offer material support to engineers who wish to follow this course. For such study, fees will be in accord with special student fees at the individual universities. In general, special students are given no credit within university meanings for the course work so taken; the objective will be simply to make the facilities and information as available as possible to men from industry.

Finally, the universities will arrange wherever practical to present refresher summer courses in the various fields in which research is carried out. Such courses will be concentrated presentations that last for one or two months only and so are practical for attendance by engineers in industry.

Participating Universities

The proposed three-university system is advanced for only three universities on the grounds that basically the system is an experimental one, that three universities at least should participate to make the experiment a genuine test, and that three is the maximum number that can be accommodated in the early stages of a genuine test. The three universities presenting this proposal are all confident of the soundness of the programme, although they recognize that it is only an experiment, and *none has the least interest in proposing any limitations on any other universities as a result of or in the course of the experiment.* In fact, if the programme is as successful as expected, other universities would be expected to join in the co-operative programme as they can demonstrate justification for establishing mining programmes of the required calibre and size within their organizations. In addition, however, other features should be recognized concerning the present distribution of mining students throughout Canadian universities.

Recent enrolment data show that more than half of all the current undergraduates in mining engineering in Canada are at the three co-operating universities. Furthermore, current enrolment trends show diminishing or very small enrolment in mining at the other universities. This can be interpreted as evidence that only the three universities involved in this proposal are likely to be seriously affected. Also, development of the new concept presented by this proposal will probably result in a substantial increase in the number of undergraduates enrolled at these three schools.

Because the graduate division at each school will require from 20 to 30 candidates per year with bachelors' degrees, it will be necessary to provide undergraduates in the three schools of about 30 per school. That assumes, perhaps optimistically, that half of each bachelors' class will be capable of and willing to undertake advanced studies, and that an equal number of similarly qualified foreign students or students from industry will be enrolled in graduate study programmes. It now appears that only four to six Canadian students graduating in 1965 will be attracted to and qualified for the new postgraduate programmes to commence in September, 1965. *This indicates considerable opportunity and even need for Canadian practising engineers to return for graduate study* especially over the next few years. The condition with regard to Canadian bachelors' graduates entering graduate school is expected to improve slightly in 1966, and by 1967 it is expected a substantial proportion of the numbers required will be in their senior year.

The probable growth in the numbers of graduates of the various classes together with the numbers available to industry as projected to 1972 is indicated in the graphs commencing on page 76.

Staff

The staff requirement for the Tri-university Project can be forecast with some accuracy according to the areas in which research will be required. The special areas of interest to mining engineering in which research will be required include the following:—

(1) Prospecting and exploitation, including geophysical exploration.
(2) Mine and company evaluation.
(3) Explosives.
(4) Rock mechanics and mine design.
(5) Mining equipment and machines.
(6) Operations research.
(7) Systems analysis.
(8) Environmental control.
(9) Administration.
(10) Ore dressing and beneficiation.

In providing staff for these above research activities, each university will automatically have available the staff required for undergraduate teaching provided three conditions are met.

First, the three universities must maintain constant communication to ensure that all new technology is available to all three universities. The staff at *each* university will *not* be expected to be actively engaged in research in *all* the 10 areas specified; it is important therefore that they are familiar with the state of the technology in areas in which they are *not* performing research. This condition is essential to ensure that the undergraduate training at each university will give adequate treatment to all technical aspects of the programme.

The second condition, an outgrowth of the first, is that each university be engaged in enough research that its staff, in total, is capable of teaching to undergraduates the material of the several technical areas involved. It is improbable that each staff man can maintain teaching competence in all of the specified areas, and therefore in each school some minimum number of staff will be required. Under this proposal it is assumed that projects of roughly equal size will be developed ultimately at each of the participating universities. If so, the condition of capacity to cover all technical areas will be satisfied.

The third condition is that there be co-ordination among the three universities to ensure research activity in *all* of the specified technical areas. This coverage should be achieved collectively, and overlapping among the universities that is not constructive must be avoided. The academic committee will provide the required co-ordination.

In accord with the above conditions, the total staff requirements for the three universities are estimated to reach 18 to 20 specialists with an additional 12 to 15 understudies. That will correspond to six specialists at each school along with four to six understudies. The understudies may be members of the university faculties or may be full-time research staff, as the individual at the university prefers. This staff level will correspond to a graduate enrolment at each school of about 20 to 30 graduate students, and to a graduate student to staff ratio of two to one or three to one. This ratio is in the range that is preferred for sound *undergraduate* training and is consistent with sound and continuous research activity. It is expected that this staff level can be reached among the three participating universities by 1971.

At present Queen's has three specialists on staff in three of the nine areas of specialization. The University of British Columbia has one specialist in rock mechanics, one specialist in surface chemistry, and two well-qualified general practising engineers capable of becoming specialists. Université Laval has two well-qualified general-practice engineers already beginning to specialize in rock mechanics and administration.

In 1965–66 Queen's plans to add two more specialists to keep pace with its graduate programme growth, and all of the Queen's staff will assist via course data and lecturing in the development of research facilities at the three schools.

Laval and U.B.C. will commence graduate studies in 1965-66 and will need to add new staff in 1966–67. To provide this staff there are two potential 1965 Ph.D. graduates from Queen's, both with lecturing experience and interest. These will be available as understudies in 1965–66.

There is reason to feel confident that the three universities can find adequate staff or train them as the schools grow. The present staff can be upgraded by doing acceptable research and may, if practical, obtain advanced degrees within the tri-university system. It is expected that reasonable assistance in routine facets of teaching and laboratory instruction will be available from postgraduate students to facilitate the entire development.

Ancillary Staff

At each university there will be a requirement for academic staff assistants. Most of this work will be done by postgraduate students, but there will be a need for an instrument technician and for a machinist at each school. These might be shared by other departments for the first two years or so, but thereafter the scope of the project will more than justify independent services for the proposed mining departments.

Each department will, of course, require a capable executive-secretary with assistant typing and stenographic help.

Buildings

The total establishment by 1971 at each university should consist approximately of the following:—

(*a*) Six top-level specialists at associate professor and professor rank.
(*b*) Six understudies ranging in rank from research assistants to assistant professors.
(*c*) Two full-time departmental technicians.
(*d*) Assorted assistants from the postgraduate candidates.
(*e*) About 20 postgraduate students.
(*f*) About 100 undergraduate students beyond the freshman year, 30 of whom would be in the graduating class at B.Sc. level.

If space requirement is set at about 500 square feet of floor area per person above the level of the junior year, the building requirement will be about 30,000 square feet. About half of the building will require special services, and the cost of such building and services varies considerably. The cost could be as little as $17 per square foot, as in the case of some recently constructed laboratory buildings, or could be as much as $30 per square foot, depending largely on the kind of structure used rather than on the architectural finish. It is suggested that a capital allowance be made to the amount of $800,000 for facilities at each of the three universities. These may be completely new facilities, or may be renovated and enlarged existing facilities. The conditions will vary somewhat among the three universities concerned.

The building *must* be available prior to the peak personnel establishment; it is expected that if funds are available in 1965–66, buildings will be available in 1967.

Equipment

All three universities have some equipment available on campus at present, and unnecessary duplication of existing or planned equipment will be avoided. For example, the large presses, such as exist in the various civil engineering laboratories, can probably be made available to the mining departments.

It has been the experience at Queen's that, aside from certain special units, the research equipment for a mining department can be built up by a yearly capital expenditure of about $20,000. Special units that require sizeable investment, such as a computer, an electron microscope, a microbeam probe, or a mass spectrograph, generally require specific financing and are established within each university on a co-operative basis. Similarly, library and photographic facilities can be shared to advantage if the campus layout so permits.

It is anticipated that after the first two years of operation, new equipment costs will come largely from research grants; special equipment for sponsored research will come from the sponsor.

In summary, the cost of providing the required equipment for graduate study can probably be met within the growth plans for the graduate programme in each school. Costs for undergraduate laboratory equipment in the mining field are not so great as to alter the basic estimate for the building significantly beyond the $800,000 level quoted.

Maintenance

The costs of maintenance of the proposed new establishments will be arranged by the universities involved. To provide the required funds, it is expected that increased special grants may be obtained from such Government sources as Mines and Technical Surveys, National Research Council, and others. Similarly, there will be a considerable increase in fees payable to the university at all levels; *per capita* grants and Provincial Government maintenance grants will be increased in proportion to the increased enrolment. Also, it is expected that industry may endow some chairs, and sponsored research should supply a considerable income.

INDUSTRIAL INTEREST AND CO-OPERATION

Role of Research

It is fundamental to engineering education that the teaching and the practice functions cannot be dissociated. A graduate who has no recognition of science has no basis for contributing to the technical growth of his employer-industry no matter how familiar he may be with contemporary practices of the industry. Similarly, a graduate who has no appreciation of the very practical restrictions that an industry must impose on science can contribute little. It follows that the success of the contemplated Tri-university Project will depend to a large extent on the interest and co-operation given it by industry.

The Canadian mining industry needs the new kind of graduate engineer who will emerge from this project; there is no security or competitive growth in trusting to the discovery of rich orebodies to perpetuate the Canadian mining industry. Instead, it is essential that better use be made of the lower-grade ores. Only in this way can Canadian deposits expect to remain competitive in an increasingly competitive world. It is essential that men be available who have the capacity to mount a sustained and vigorous programme of research, and also to exploit the technology now available and to be obtained. Also, the most logical and efficient way to provide for growth in technical information and technical personnel for the mining industry on both a

long-term and an immediate basis is through effective use and development of existing university facilities. Only in the universities can intensive continuous research be coupled with the essential undergraduate and graduate teaching programme.

Role of the Mining Engineer

It is already clear that no substantial number of highly trained engineers will be available from this programme within the next few years, although the numbers available will certainly increase gradually. However, thereafter a planned programme can yield the required numbers if the programme is attractive to potential engineers. Two features seem all-important.

First, there appears to be no incentive for engineers to move toward the field of mining engineering under the present understanding and activities of mining engineers. *Students* relate their lack of interest to their understanding that there is limited potential for applying advanced technology in mining; considerations of salaries, location, and other interests are secondary at best.

Second, the current experience at Queen's University, where a highly technical mining programme is already underway, indicates clearly that the technical content of the programme is a convincing factor. The interest and enthusiasm of visiting high-school students are striking; the applications for postgraduate study in mining engineering far exceed the openings available.

Clearly the role of the mining engineer in industry must be established as one in which technical competence dominates and one where research interest can grow. It follows that co-operation among the universities and the industry will be essential, and that no real co-operation will be sustained unless these groups accept their relative roles in the responsibilities involved. All must make real contributions. The Government is a third party which as a grantor and as an assistant in training must be included in the project.

Buildings

The capital cost for new buildings or expansion of existing buildings must be the responsibility of each inidividual university. However, the steering committee must assume a responsible role in obtaining capital funds. As a minimum role, the steering committee will provide strong endorsement for appropriate university proposals and active support where possible.

Research Projects

To create strong engineering research schools under the Tri-university Project, numerous research problems which have a high early potential value will be required. Much of this work should be sponsored by the industry, and as such two categories are involved: problems of a general nature should be sponsored by the industry generally through such organizations as the Canadian Metal Mining Association and problems of a specific nature that should be sponsored by the company concerned.

There will be many research projects initiated by the university and supported by the university or the Government. Wherever possible the results of the work will be made available *first* to Canadian industry because primary objectives of the entire Tri-university Project are service and support for the Canadian industry in particular.

Full protection of the rights and confidences of sponsors can be readily arranged in the various research projects under agreements already commonly used in such cases by universities.

Co-operative Education

In the education of the engineer there are some things best learned in university and some things best learned in industry; during the undergraduate years it is a costly waste to teach material that can be better taught in industry. Co-operation is therefore necessary between the university and industry to achieve the full educational potential of the student in the undergraduate years. This will require careful planning of the student's summer employment.

Summer work for student mining engineers must be planned and considered as an educational requirement; it must not be merely a job or merely " underground experience." Rather, it must centre on the topics *not* being taught in the university, and must also indicate to the student the nature of the field toward which he is working. Clearly, close liaison between the industry and the university will be necessary to ensure the student, the university, and the industry of maximum benefit from the proposed educational project.

One of the interesting returns of a co-operative training programme such as will be required is the likelihood of increasing thereby the participation of Canadian students in the programme. The favourable publicity that arises from co-operative efforts of this sort should only emphasize and expand Canadian interest in mining. This is important especially as it affects postgraduate student enrolment; there is no problem in filling a graduate school with students from other countries, who, when they have their higher degrees and advanced knowledge, return to their own countries. Canadian participation is as essential to the success of the programme as it is to the continued success of the Canadian mineral industry.

THE FEDERAL GOVERNMENT CONTRIBUTION

A National Plan

The Government of Canada and those of the Provinces should be intensely interested in the Tri-university Project as a truly National project designed geographically and ethnically to cover most of Canada. As noted earlier, enlargement of the group at some future date should be relatively simple if the project is successful. Its present size is the minimum for a real test and the maximum for test operation.

The three universities, in recognition of the urgency and need, are proposing in the tri-university plan a united National front to complement and to supplement each other so as to meet the need in the shortest possible time and at the minimum cost.

A considerable part of the cost will be borne by the universities directly and by industry on a National basis. The various government bodies are asked to support the project on the same basis. It is essential to have the full co-operation of all groups.

The Government of Canada has always recognized the needs for equipment and scholarships, and it will be asked to give special attention to these details in the proposed Tri-university Project. No immediate or sudden increase in support for any of the participating universities is expected or planned, but a considerable increase will be needed over the next five years.

Specialized Equipment

As has been the case in the past, grants for highly specialized or large equipment will be made to the appropriate government body. Such grants for the field of mining engineering are not expected to be larger than those given in other fields, however, so that the proposed Tri-university Project will carry essentially the same relationship to granting bodies as other university departments.

Scholarships, Bursaries, and Fellowships

Financial assistance to well-qualified students and staff should be made available on a larger scale than is currently the case. In addition, post-doctoral grants must be made available, particularly during the years of staff build-up. Ultimately, grants from N.R.C., the Department of Mines and Technical Surveys, and others will be greatly increased, possibly tenfold.

THE PROVINCIAL GOVERNMENT CONTRIBUTION

The Province has always assumed responsibility for education within its boundaries. This responsibility has been reflected in the universities in grants for capital expenditures, for research in education, and for maintenance of facilities. Accordingly, the approach to Provincial authorities under this project will be exclusively the responsibility of the individual participating universities, although the support of the steering committee and of the academic committee may be available as such support is sought and earned by the participating university.

For the present report it is only suggested that an initial grant for capital expenses be made by the Provinces concerned, and that thereafter a reasonable increase in the total maintenance grant be included in the yearly budget for each university. In this way the value of the improved system will be continually tested and *only justified increases will be recognized and incorporated into the Provincial operations.*

THE UNIVERSITY CONTRIBUTION

The university will be making a financial commitment from its own funds. These come from fees, endowments, special gifts, *per capita* grants, and other sources. In this way a fair share of the burden can be carried by the university directly in partnership with industry and government. Most important, however, is the obligation to the industry, the province, and the nation that the university assumes under the Tri-university Project. The plan constitutes acceptance by the university of an obligation to maintain and promote technology in a field of extreme National interest.

In addition, several specific items that will be provided by the university can be mentioned.

Staff

The university will finance and have available well-qualified staff for

(*a*) undergraduate teaching;
(*b*) postgraduate teaching and supervision;
(*c*) consultation on research problems;
(*d*) active research projects to be undertaken at the university and also in the field;
(*e*) the computing centre;
(*f*) the library and ancillary services;
(*g*) related staff from other disciplines for multi-departmental projects.

Building-site

This will have to be supplied by the university and must be included in the campus planning.

Space and Services

Office space and services such as purchasing, accounting, and public relations, along with existing laboratory space and classroom facilities, will be provided by the university. In addition, technicians for servicing and maintenance will be a part of the normal university expense.

Equipment

All equipment currently on hand and a fair yearly new-equipment budget will be provided by the university. Equipment such as the computing centre and other equipment available within the remainder of the university will be accessible in the usual way to the mining engineering department.

A CENTENNIAL YEAR CONTRIBUTION

It is evident that such a university co-operative project represents a new concept in engineering education. It is suggested that in its scope, in its co-operative aspects, in its working partnerships, and in its National planning, it is a worthy Centennial Year project, not only for the university, but also for the industry and for the Governments involved.

A time-table of events would be about as follows:—

1965: Set up the partnerships and co-operative committees. Commence advertising and research, together with a new undergraduate programme. Raise funds.

1966: Continue the growth pattern and fund-raising. Plan and commence building construction. Formal initiation of the Tri-university Project.

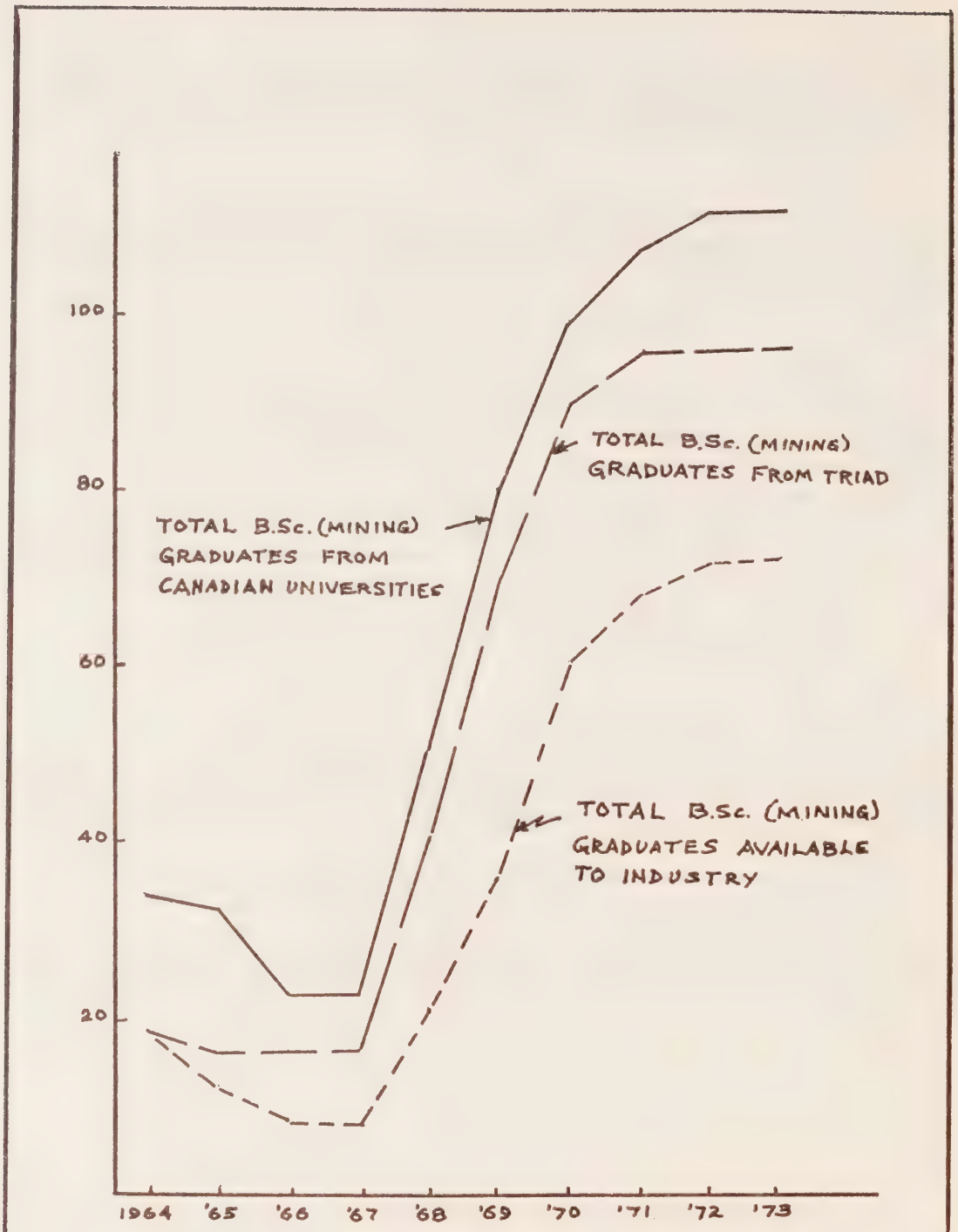
1967: Move into new building and expand as rapidly as possible all aspects of the project.

PATENTS, REPORTS, AND PUBLICATIONS

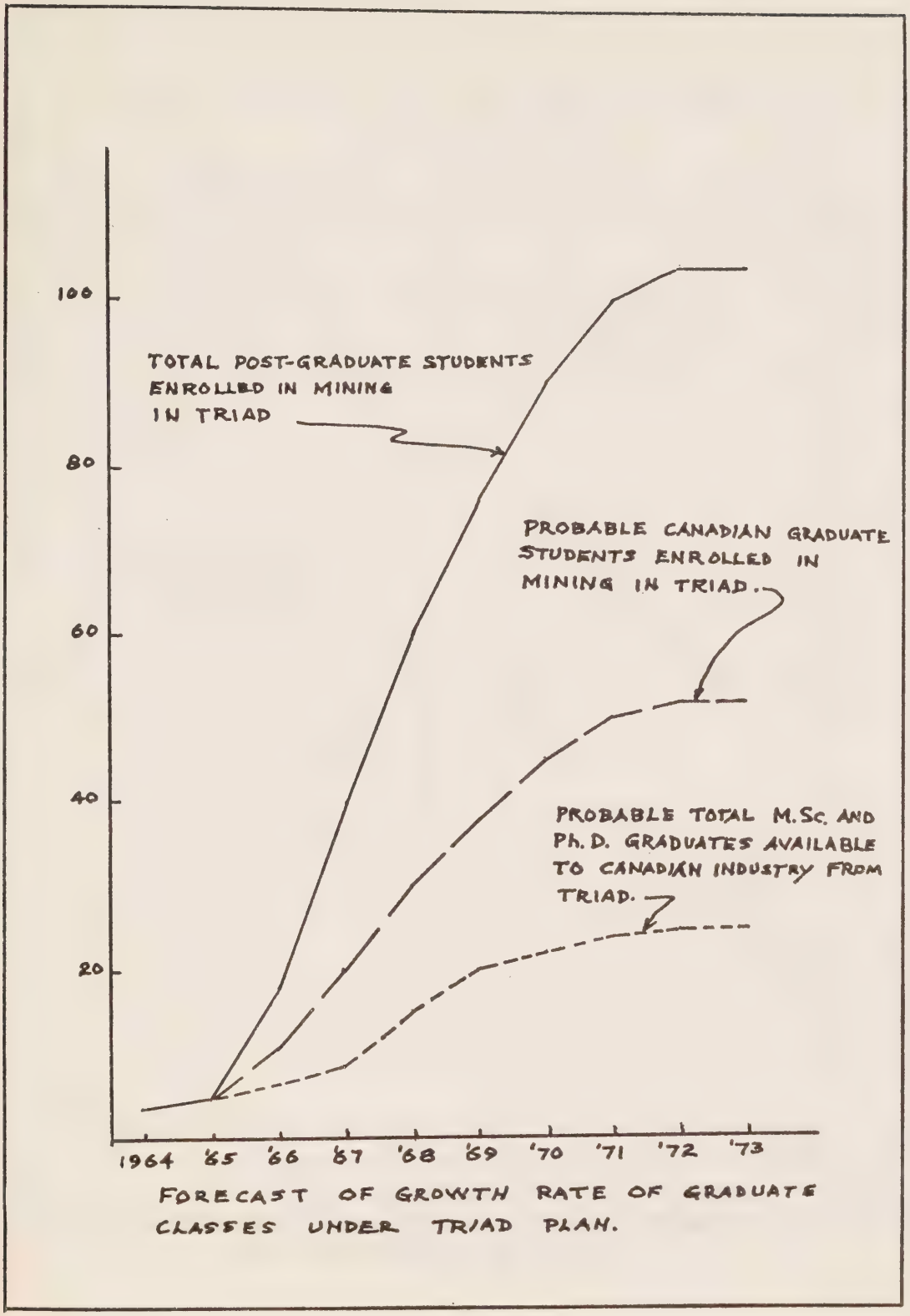
Patents arising out of work done at each university will be the property of that university, and its release will be subject to the regulations in effect at that university. In general, supporters of the Tri-university Project will be afforded every advantage available under the individual university's regulations.

Generally, sponsored technical work will be reported to participants in semi-annual progress reports prepared by staff and will form the basis of seminars, symposia, etc.

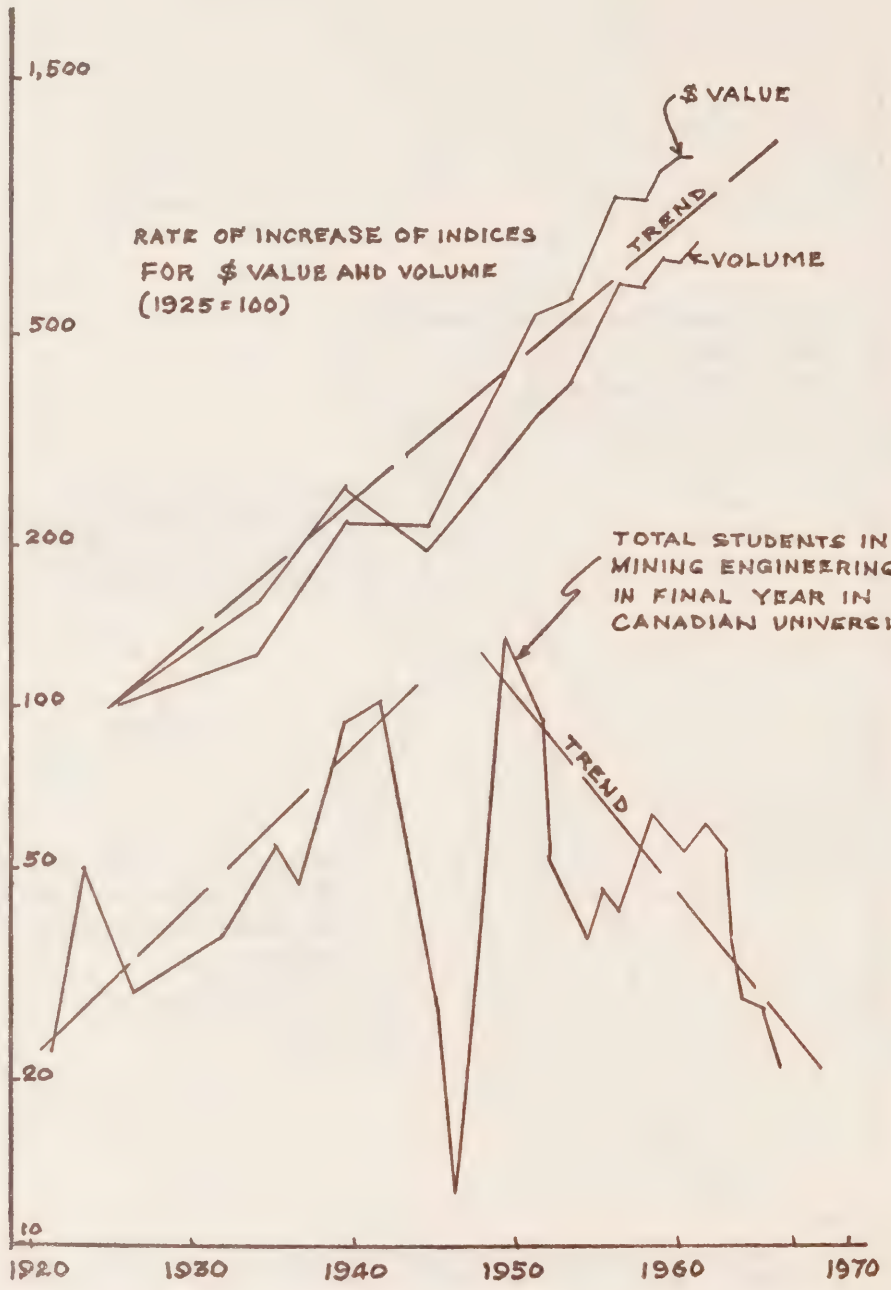
No papers will be published or presented before the issuance of the semi-annual progress report containing the pertinent data, and copies of all papers will be made available to all participants before presentation or publication. In the preparation of papers, quality will take precedence over quantity.



FORECAST GROWTH RATES FOR GRADUATING CLASSES IN MINING ENGINEERING UNDER TRIAD PLAN



FORECAST OF GROWTH RATE OF GRADUATE CLASSES UNDER TRIAD PLAN.



RATES OF GROWTH FOR MINERAL PRODUCTION
AND FOR CLASSES IN MINING ENGINEERING IN CANADA
(C.I.M.M. BULLETIN, SEPT 1964)

THE UNIVERSITIES AND TECHNOLOGIC OBSOLESCENCE

By L. G. R. Crouch

The introduction of this topic to the deliberations of the Mines Ministers' Conference is timely. A shortage of engineers is not the only problem the mining industry could be facing.

During recent years many pronouncements have been made on the subject of technological obsolescence, especially with reference to space technology, new materials, chemical industry. But many people in the mining industry are saying these pronouncements do not apply to our industry: Canada is richly endowed with mineral resources, other countries need the products of our mines, and our mining industry is technically progressive. Surely the spectre of technological obsolescence does not hover over the mining industry of Canada.

Yet at the same time it is admitted that Canada's mineral products must be marketed competitively, and that in order to compete, production costs must be kept down. Also, economists concerned with natural resources are pointing out more insistently that other countries will not necessarily beat a path to our door in order to purchase our minerals just because we have them. In the potentially competitive situation that lies ahead, perhaps very soon for some mining organizations, perhaps farther ahead for others, production costs can be kept down only through continuing technological innovation—new ideas, new processes, new equipment, improved systems.

Up to the present time the Canadian mining industry has been competing successfully for markets: it has been progressing technologically. However, many of the new ideas it has adopted, and many of the new pieces of equipment, have come from outside the country—from Sweden, England, Germany, and other places. An industry that depends to too great an extent on merely adopting ideas developed elsewhere is potentially vulnerable because of the time lag inevitably involved. The need for more research and development work in Canada on mineral-industry problems has been emphasized on many an occasion during recent years.

Nevertheless, wherever the original work is done, the results do not become useful to the industry at large until they have been published and thus made available to all who will take note of them; that is, to the industry's engineers, for it is primarily the engineer's function to translate the results of research into practical application. Until not long ago, a graduate engineer, not long out of university, could read and understand without too much difficulty virtually any article or paper which appeared in the regular mining periodicals or transactions. Recently, however, papers have appeared in these ordinary journals which were undoubtedly incomprehensible to most mining engineers, perhaps even the conclusions reached. This is an ominous situation, for if the engineers, the supposed translators of research into practical application, cannot understand the published results of research, is not some degree of technologic obsolescence a distinct possibility?

Such a state of affairs should not be allowed to continue. If the situation is to be changed, the universities must take the lead, but this they can do only with the active interest and co-operation of the industry.

First of all, the universities must produce a different kind of engineer—one who is more highly trained, who has a deeper theoretical knowledge, and who is oriented more toward the " development " function than heretofore. University undergraduate curricula are being changed toward this end already. At the same time also a concerted effort is being made to expand course offerings at the graduate level and to stimulate the better students to continue their studies beyond

the bachelor's degree. The mining industry must then provide an environment in which these graduates will make the contribution of which they will be capable. The more progressive components of the industry have made good progress in this direction already, and will realize the benefits.

Secondly, the universities must organize a regular programme of continuing education for engineers in industry, of regular courses of one week's duration, or two weeks, or longer, for which engineers can return to the university at regular intervals in order to gain new insights. This is widely accepted practice in training men for management, but its pertinence for engineers engaged in research and development activities has not been realized yet. Some other industries have gone much further than the mining industry in this regard. In due course, company-sponsored attendance by engineers at such courses is likely to constitute an important fringe benefit for the attraction of competent engineers to a company's staff. Again, the universities have begun to offer refresher courses of the nature indicated, and additional courses will be developed immediately to meet the need.

However, in order that the universities may be able to provide the kind of undergraduate and graduate training that is envisaged, their mining departments must change in nature. No longer will a small department of one or two general jack-of-all-trades mining engineers suffice. Such an establishment is outmoded. In order that the necessary programmes of undergraduate training, graduate research, and continuing education be developed to the extent that they should be, a group of specialists is required. Such a group can be built up only with the support and co-operation of the industry and of government. Without this support in the form of interest, money, and research projects, the university departments cannot become fully effective in developing the knowledge and skills that the mining industry is going to need in the years ahead.

It is to be hoped that this year marks the beginning of a continuing dialogue between the universities and the mining industry aimed at developing those facilities within the university and those conditions and attitudes within the industry whch will mantain the Canadian mining industry in a flourishing state by banishing the spectre of technological obsolescene.

EDUCATION AND THE MINERAL INDUSTRY

By P. M. Dranchuk

That the ever-increasing manpower shortage threatens the very life of our industry is no longer a mere cry of the educators but is a widely accepted fact. In the last several years a great deal of effort has been exerted to combat the situation. Since our industry is technical by nature, the manpower it requires must have at least a minimum of technical training or education. Consequently, the attack on the problem has taken the form of an all-out effort to entice people into enrolling in various educational programmes. The results to date have been similar to those experienced by the aerospace people. We've had some projects which have never left the launching-pad, while others have risen 10 feet, only to fall over on their side and become enveloped in a cloud of smoke and associated hot air. Some have even gone into orbit. However, we have yet to strike our objective.

Why have we failed? Will we succeed in the future? These are the questions which are now all-important. It is my humble opinion that our efforts have failed because we have prescribed remedies of the past for maladies of the present. Many take issue with this opinion. They point out that the geologist's success lies at least in part in his philosophy that the past is the key to the present. They also quote a great but unknown philosopher who observed that history is a great teacher. I do not question the validity of these observations; in fact, I occasionally quote George Santayana in this regard. However, I maintain that experiences gained in the past, if they are used to solve the problems of the present, must be used with wisdom and due consideration for existing conditions. In this regard you may recall the story of the drunk who, while progressing toward his home in random fashion, produced a match, struck it on a brick wall, only to have the wind extinguish the flame. Whereupon he struck the match again and then a third time, then wandered on mumbling, " Damn funny thing, it did it before."

It is by no means an easy task for a man to step aside and look at himself. We can appreciate this difficulty by realizing that since we live in a world which is geometrically three dimensional, we have little difficulty coping with one-dimensional problems. Even two-dimensional problems are not too difficult. However, we are not always certain about problems dealing in three dimensions. But to ask us to consider four or more dimensions is usually just a bit too much.

However, if a man is to progress at a rate somewhere near that which he desires, he must regularly step back and reappraise his position. Although this has always been the case, it is especially so today, since we live at a time when change is occurring at a rate never before experienced by man. Therefore, the leaders of our society must either change at a rate equal to that of the world which surrounds them, step down, or stand in the way of progress.

To present the full implication of this line of reasoning would require both time and ability. Since I have little of the first and there is some question as to whether or not I have enough of the second, let me read you the words of a man who at the time he uttered them obviously had plenty of both. I refer to " The Affluent Society," by John Kenneth Galbraith, where he compares past societies, which were poverty stricken, to our present affluent one. I quote (page 14):—

" No one would wish to argue that the ideas which interpreted this world of grim scarcity would serve equally well for the contemporary United States. Poverty was the all-pervasive fact of that world. Obviously it is not of ours. One would not expect that the preoccupations of a poverty-ridden world would be relevant in one where the ordinary individual has access to

amenities—foods, entertainment, personal transportation, and plumbing—in which not even the rich rejoiced a century ago. So great has been the change that many of the desires of the individual are no longer even evident to him. They become so only as they are synthesized, elaborated, and nurtured by advertising and salesmanship, and these, in turn, have become among our most important and talented professions. Few people at the beginning of the nineteenth century needed an adman to tell them what they wanted.

" It would be wrong to suggest that the economic ideas which once interpreted the world of mass poverty have made no adjustment to the world of affluence. There have been many adjustments, including some that have gone unrecognized or have been poorly understood. But there has also been a remarkable resistance. And the total alteration in underlying circumstances has not been squarely faced. As a result we are guided, in part, by ideas that are relevant to another world; and as a further result we do many things that are unnecessary, some that are unwise, and a few that are insane."

Elsewhere he says (page 16):—

" Illusion is a comprehensive ill. The rich man who deludes himself into behaving like a mendicant may conserve his fortune although he will not be very happy. The affluent country which conducts its affairs in accordance with rules of another and poorer age also foregoes opportunities. And in misunderstanding itself it will, in any time of difficulty, implacably prescribe for itself the wrong remedies."

Although Galbraith is speaking primarily of economics, it takes little imagination to see that this fits the situation in the mineral industries like a glove.

For the sake of completeness, let us first consider industry's position. Management is currently composed of men who completed their formal training anywhere from 15 to 30 years ago. Upon completion of this training, if they were mining engineers, they spent some time gathering samples, doing underground surveying, calculating volumes, then progressed to shiftbosses and so on until they reached their present positions. With or without much thought they consider their early apprenticeship and present success to be related as cause and effect. Consequently, they sincerely feel this to be a proper diet for their own sons, leave alone the new graduate.

Serious examination casts real doubt upon the cause-and-effect relationship which these men accept. When one realizes that these men spent the first five or so years of their employment as what one might call apprentices, and that with regard to intelligence these men represent probably the upper 10 per cent for their generation, one wonders whether they haven't succeeded in spite of the apprenticeship rather than due to it! Although this must remain in the realm of speculation, one thing is certain, and that is that this type of diet, whether or not it be the best thing for him, should not be suggested for the fresh graduate of today. The reason is that you are more likely to attract him to a career in the army with an offer of a white horse and a suit of armour, for although old things irritate him, he is fascinated by true antiques.

If we now examine the universities and their part in our problem, we realize that in Canada we have always been proud of the fact that although we had few universities, they were all of the Class A variety. We didn't offer football scholarships or campusology, or the like. Everyone came out with a good degree or none at all. However, the graduates of these universities were, and to a great extent still are, required to fill a complete spectrum of societies needs. The shortcomings of this system are evident in the technical industries. Here the university graduate is used to fill the gap from the labourer on up. Consequently, most of the graduates who were in the lower half of their class are in fact employed as technicians. This has never worked very well, and it presently appears as if in the future it will cease working altogether. A graduate of today, no matter in what field, has been trained to be a thinker, and as a result he cannot find satisfaction

in the execution of routine or repetitive tasks. The result is that industries which insist upon utilizing university graduates as technicians are finding fewer and fewer takers.

The time seems long overdue for the establishment of adequate technical schools which will turn out men who can both do the job and remain happy doing it. In addition, industry must be convinced that a great portion of its technical manpower requirements can best be satisfied by men of this type.

These ideas are not new, for I have expounded them for a number of years. But the mineral industries prefer to ignore them. This action is quite understandable since industry is filled with former graduates who, as the result of the passage of time and to some extent their own actions, have become mere technicians who continue to delude themselves into believing that they are still abreast of the times. They correctly interpret my statements to mean that most of this work can and should be done by technicians. When pressed they ask, does he seriously think that our industry has no need for engineers? The answer is obviously no! The question therefore arises, what should be the task of the modern engineer in our industry?

To answer let us look at the skilled worker in this industry. In this regard I was interested in reading a recent newspaper article which stated that Mr. Hindson, who is Chairman of the General Education Committee of the C.I.M., and who is with us today, observed that the mining industry is experiencing a shortage of skilled labour. It went on to quote him as saying that these men were currently being obtained from abroad, but that this source was rapidly drying up. Let me make it clear that I do not question the accuracy of Mr. Hindson's observation. In fact, I predicted this state of affairs some years ago. Anyone who was willing to examine the facts could have made the same prediction.

Traditionally, most of our good skilled miners have been foreigners who were highly intelligent but had little formal education. In fact, many were illiterate. Since they were intelligent, they could adapt themselves quite readily to a variety of tasks. The awareness that their lack of formal education restricted their choice of occupation was sufficient to permit them to accept their way of life. Their ability to earn good pay and accumulate worldly goods, they felt, was adequate compensation for being looked down upon, abused, and discriminated against on the basis of their ethnic origin, and their inability to handle our language. However, such a situation cannot long continue. In today's world it is becoming harder and harder to deprive a man of a formal education. As a result, we are faced with a difficult situation. Today a man, be he a foreigner or not, who has the intelligence of many of the miners we once knew, also has a formal education and feels he needn't do that type of work. On the other hand, a man whose intelligence is such that he is willing to do the job, we feel, is not quite smart enough to do the job to our liking. This is the classical situation of the man whose pride would not permit him to join any club that had standards so low as to accept his application.

Ladies and gentlemen, I am convinced that in the future we shall have to mine ores which are but one-tenth as rich as those which we consider marginal today. We shall have to do this with more technicians, fewer engineers, and less skilled labour of a lower quality. Who is going to design such a system? Who else but the most sophisticated engineers our universities can produce.

In conclusion let me admit that I have not provided you with an answer to our problem, but I did not intend to do so, for the simple fact is I do not know that answer. I have tried to suggest a line of reasoning which may lead to that answer, and above all to bring you to realize that the answer hinges on one extremely important point. I can best express that point by repeating the words of a radio announcer, whose name I cannot now recall, but who used to awaken me every morning when I was a schoolboy. His words were: " Yesterday is gone, tomorrow never comes. Today is the day we live! "

CLOSING PLENARY SESSION

At the closing session held on Wednesday, September 15th, at 10 a.m., the Honourable Daniel A. Riley, Q.C., Minister of Lands and Mines for the Province of New Brunswick, extended an invitation to the Twenty-third Conference of Ministers to be held in Fredericton from September 18 to 21, 1966.

Printed by A. SUTTON, Printer to the Queen's Most Excellent Majesty
in right of the Province of British Columbia.
1966

400-1265-185

LITHOGRAPHED IN CANADA BY A. SUTTON, QUEEN'S PRINTER, V